Urban Planning, Sustainable Development and Flooding:

a case study of Port Harcourt city, Nigeria

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This thesis is presented in fulfillment of the requirements for the Degree of

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Statement of Authentication

I hereby certify that the work is presented in this thesis is, to the best of my knowledge and belief, original. I declare that this material has not been submitted, either in full or in part to any institution for the award of any degree. Every relevant contribution has been acknowledged.

Dedication

I dedicate this work to my wonderful kids Chidiebube, Chimamanda and Chidubem. You inspired me to work hard in more ways that you can ever imagine. You are the best thing that happened to me.

Acknowledgements

First of all, I would love to thank God for making this journey possible and for his mercies and love. I thank my dear family for the various forms of support accorded me during my studies. A very special thanks to my husband Martin for everything, and my dearest mother Constance for her tenacity and sacrifices.

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Abstract

Flooding is the most widespread environmental disaster in Nigeria and flooding impacts are exacerbated by poor urban planning. Flooding is a direct impediment to Nigeria achieving its sustainable development goals, particularly SDGs: 1: No Poverty; 2: Zero Hunger; 3: Good Health and Wellbeing; 4: Quality Education; 6:Clean Water and Sanitation; 8: Decent Work and Economic Growth; 11: Sustainable Cities and Communities; and 15: Life on Land.

Using the city of Port Harcourt as a case study, this thesis sets out to investigate the relationship between urban planning, sustainability and flooding in Nigeria. Given the key role of urban planning in achieving sustainable development, and given that poor planning has been linked to flooding in Port Harcourt, practicing planning professionals were interviewed to understand their views on the city's flooding problems. Research questions explored how the concept of sustainable development is understood among planners in Port Harcourt, how urban planning influences the flooding being experienced in Port Harcourt, the effects of flooding on Port Harcourt's sustainable development, how the flooding impacts Port Harcourt's residents, and ways the effects of flooding can be mitigated. While urban planners are responsible for implementing policy changes in Port Harcourt to tackle the flooding problem, their views had not previously been explored. This thesis thus represents a new area of research linking urban planning, flooding and public policy.

The thesis argues urban planners of Port Harcourt Nigeria have a sound understanding of sustainability and are fully aware of the connections between poor urban planning and flooding, however widespread non-compliance with planning laws and improper building approvals undermines the city's legal and planning architecture that does exist to control floods and achieve Nigeria's SDGs.

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List of Acronyms

COI	Cost of Illness
GPHCDA	Greater Port Harcourt City Development Authority
IPA	Interpretative Phenomenological Analysis
NGO	Non-government Organisation
SDGs	Sustainable Development Goals
SUCEED ND	Sustainable Composite Cities Environmental Evaluation and Design Tool Neighbourhood Design
UN	United Nations

Preface

In Nigeria, I lived in an area of Port Harcourt, at the southern end of Nigeria, that did not flood. Then in 2016, my suburb began to flood. In the few years prior to the floods, large-scale new housing developments had been built in the area. Most of these new estates/ buildings had the necessary building approvals however, the underpinning civil infrastructure of drains and run off corridors were not put in place, hence the flooding began. It became a yearly occurrence with each year's magnitude exceeding that of the previous year. I tried to engage with the concerned authorities to draw attention to the problem and have it fixed, with no luck. This was the motivation for this research. My initial goal was to engage with the affected community residents to hear their thoughts on why the flooding was occurring, but this was not feasible given the timeline of a Master of Research project. I therefore sought to engage with urban planning professionals in the city who had firsthand knowledge on the issue, as well as professional knowledge to help inform and drive change. This work is the product of my engagement with the urban planners in the city of Port Harcourt.

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Chapter One: Introduction

1.1 Background

Nigeria is a West African country and a former British colony that gained independence in 1960. It prides itself as the giant of Africa with a population of over 200 million people (United Nations, 2019: 14). Crude oil is the mainstay of its economy and it is one of the world's largest producers of oil.

Figure 1: Map of Nigeria showing Port Harcourt and other cities.

Nigeria's current population growth rate is estimated at 2.8% - 3% per annum, and its current level of urbanization is 49% (Oni-Jimoh et.al, 2018). Nigeria's urbanization has been rapid with its urban population growing to 62.5 million between independence in 1960 and 2010. In 2018 Nigeria was ranked 157 out of 188 nations on the United Nations' Human Development Index (UNHDI). Since the inception of the UNHDI, Nigeria's ranking has remained in the 'Low Human Development' grouping (Farrell, 2018; UNDP, 2016).

Rivers State is a state in Nigeria and the city of Port Harcourt is its capital. Lying in the oil-rich Niger Delta region, in the Southeast of Nigeria, Port Harcourt is the country's fourth largest city after Lagos (Southwest), and regional centres Kano (Northwest) and Ibadan (Southwest). The discovery of oil in 1956 and the later attempted secession of Biafra from Nigeria (1967-1970) made Port Harcourt an important centre, and today Port Harcourt is known as Nigeria's 'oil city'. The city covers about 1,900km^2 and has a population of approximately two million people (Dan-Jumbo, 2018; Nlerum & Wechie, 2018). This represents an increase of around 600,000 people from the population recorded at the 2006 census. The population is a melting pot of indigenous and non-indigenous ethnic groups as well as expatriates from all parts of the world who work mostly in the oil and allied industries sector. The city of Port Harcourt is comprised of the old port township area, the old Government reserve area where the British colonial administrators lived, the new Government reserved areas, as well as a massive sprawl area comprised of hitherto mainly rural areas that have become bubbling suburbs such as Eneka, Rukpokwu, Elelenwo, Mgbuoba, and Rumukurushi. Port Harcourt's urban sprawl can be categorized as three areas: (i) Urban sprawl, consisting of disorganized expansion in the original urban area by in-filling and annexing without proper coordination (the old township area fits into this category); (ii) sub-urban sprawl, meaning expansion of the city beyond current settlements (Eneka, Rukpokwu, Nkpolu, Mgbuoba suburbs are examples of this); and (iii) rural sprawl, where

farmlands and woodlands give way to business and residential buildings (Aprioku & Akujuru, 2010).

The increase in Port Harcourt's population is driven by the quest for people to have a better life in the form of employment and a better standard of living (Adekola, 2016). As the rate of poverty in Nigeria has worsened (Brock, 2012; Orokpo & Mutong, 2018), people are migrating from the rural areas as well as from other smaller cities in search of opportunities. Migration to Port Harcourt is driven by job opportunities in the oil sector, better business opportunities, better amenities, and generally a higher standard of living compared to other areas of emigration. This increase in population has led to a higher demand for housing (Wizor, 2014b). Due to an ineffective government presence and commitment in the housing sector, people generally take charge of their own affairs (Awofeso & Odeyemi, 2014; Olugbenga, et.al. 2017). The lack of effective formal development process has resulted in housing of various forms (often without adequate infrastructural planning) being constructed to meet the housing needs of Port Harcourt's growing population (Iheme, Effiong, & Ekung, 2015). The haphazard planning and layout of these new residences and settlements has had a negative effect on the environment (Akukwe, 2014) and prompted environmental disasters such as flooding (Olujimi, 2009), which is now a fact of life for many Port Harcourt residents. This suggests a close relationship between urban planning, lack of effective development processes and the flooding being experienced in Nigeria (Ogundele & Jegede, 2011).

Flooding is widely recognised as a global problem which has worsened due to climate change in recent years. It is one disaster that has the capacity to reverse years of development, and it is thus an impediment to achieving the United Nations Sustainable Development Goals (SDGs) (Kundzewicz, 2002; Mathur, 2006). Flooding threatens sustainability because it negatively affects the economy, social life, environment and health (Ludwig et al., 2007). The

negative impacts of flooding are not restricted to a particular geographic area, as evidenced by the 2019 floods in Queensland Australia (Trask, 2019), the 2013 floods in Germany (Thieken et al., 2016), and flooding in the UK (Miller & Hutchins, 2017; Ochoa-Rodríguez, et.al., 2017). In 2012, Nigeria experienced its worst flooding in about 50 years (Nkeki, Henah, & Ojeh, 2013; OCHA, 2012; Toure, 2014). More than 2.3 million people were rendered homeless, 363 lost their lives and another 16 million people were impacted in various ways. Total losses were put at US$16.9 billion (Security, 2013). The disruptive effects of flooding disasters on progress towards the SDGs are felt more in developing countries like Nigeria because of its lower level of development.

Disasters of such magnitude focus global attention, however, smaller, frequently occurring disasters are not paid as much attention, and these have become a part of life for many in Port Harcourt, especially among the poorer marginal groups. Annual floods have become a constant threat to their economic and social wellbeing (Owolabi & Ekechi, 2014). These smaller scale disasters are more recurrent than the headline-grabbing ones, however, the effects are no less important than in major events, yet the authorities, media and experts pay little attention to localised annual flooding problems across Nigeria (Nkwunonwo, Malcolm, & Brian, 2015).

1.2 The United Nations' Sustainable Development Goals

The United Nations Sustainable Development Goals (SDGs) came into existence in 2015 and call for action by all nations of the world, irrespective of development status, in a global partnership (UN, 2015b) to achieve the goals by transforming the world through addressing numerous issues facing humankind to ensure economic prosperity, well-being and environmental protection for both developed and developing countries by 2030. The SDGs are interdependent and indivisible, balancing the three basic dimensions of sustainable development: the social, economic and environmental. As opposed to traditional development

goals which focus on a prescribed set of measures, the SDGs proffer a multifaceted and holistic take on development (Pradhan et. al., 2017). The United Nations recognises poverty as the biggest global challenge and a crucial factor in achieving sustainable development (UN, 2015a). Perpetual flooding disasters entrench affected inhabitants into a cycle of perpetual poverty (Dube, Mtapuri, & Matunhu, 2018a) which is inimical to achieving the SDGs.

1.3 Research gap

In recent times, the frequency of flooding episodes in Nigeria is on the increase, and it is set to worsen in the years to come (Cirella & Iyalomhe, 2018). Flooding is one of the biggest threats to achieving sustainable development. Despite the seriousness of the flooding problem in Nigeria and its impact on Nigeria's sustainable development, a lot remains unknown as to the extent of Nigeria's flooding problem. This knowledge gap is more evident when compared to the body of studies from other countries that also experience flooding like China, US and the UK (Nkwunonwo et al., 2015). This necessitates more research to understand and control this hydra-headed problem with wide-ranging impacts. Even though research has linked poor urban planning to the flooding in Nigeria (Cirella & Iyalomhe, 2018; Dabi & Kporha, 2015), gaps still exist, and little has been done by way of engaging urban planning professionals themselves to ascertain their views on this relationship. There are pockets of smaller scale flooding events in Nigerian cities, the effects of which are also significant. The negative impacts of smaller-scale floods can manifest as secondary threats (Pelling, 2003). For example, floods cause immediate issues with pollution, sanitation, unsafe housing and everyday risks such as drowning, and then manifest as deaths caused by diseases and long-term illnesses. Factors capable of negatively impacting on sustainable development, like poor urban planning capacity which enhances flood risk, need to be pinpointed. The relevant connections between flooding, poor urban planning and governance need to be

illuminated and addressed to promote sustainable development and build urban resilience. Urban resilience refers to ways of addressing climate change induced threats like flooding in urban areas (Tyler & Moench, 2012). It is a significant factor in sustainable development and merits closer examination to gauge its effects on the SDGs (Brown, et.al. 2017).

1.4 Statement of the Research Problem and Research Questions

This thesis seeks to explore the links between urban planning, sustainable development and flooding, in Port Harcourt. It achieves this by asking four main research questions:

1. How is the concept of sustainable development understood among urban planners in Port Harcourt?
2. How does urban planning influence the flooding being experienced in Port Harcourt city and how does it affect sustainable development?
3. How does the flooding impact the residents of Port Harcourt city?
4. In what ways could the flooding be better controlled?

1.5 Significance of the study

This study of the relationship between urban planning, sustainability and flooding in Port Harcourt is, to my knowledge, the first of its kind. It sheds light on the professional opinions of urban planners on the increased flooding incidence being experienced in Port Harcourt city and its environs. Their understanding of sustainable development is investigated, as well as how they implement this understanding in carrying out their day-to-day work. Exploring this matter through the lens of sustainable development in Nigeria's urban expansion is a novel approach. This work aims to contribute to knowledge in the aforementioned areas, as well as to drive policy change. The ultimate goal is that the engagement of planning experts in this research will make relevant stakeholders listen more, and adopt policy solutions to control the flooding problem in order to better meet the challenges of sustainable development. This

work also contributes to knowledge by exploring this as yet unexplored but increasing phenomenon, and it proffers solutions to the flooding that impacts heavily on the inhabitants of Port Harcourt and is thus a stumbling block to Nigeria achieving its SDGs. The potential also exists for this work to inform policy change in the planning and development processes in Rivers State, and Nigeria generally.

1.6 Outline of the Thesis

This thesis is organized in six chapters. Following this introductory chapter, Chapter Two reviews the literature on urban planning, sustainable development and flooding, seeks to unpack the links between the concepts, and identifies current gaps in research. The conceptual framework utilized in the study is also presented. Chapter Three presents the methodology and methods used in the study. Chapter Four and Chapter Five are the discussion chapters. Chapter Four presents the urban planners' understandings of sustainability and the sustainable city using Port Harcourt as a focal point. Chapter Five discusses the relationship between planning and flooding while highlighting the contributory factors and also the impact of flooding. Chapter Six concludes the thesis, summarizing the findings, as well as providing recommendations and suggestions for further research.

Chapter Two- Literature review

2.1 Introduction

This chapter first reviews the wider literature surrounding sustainable development and contemporary urban planning principles. It then discusses the flooding menace, flooding and urbanization in Africa, flooding and the Sustainable Development Goals (SDGs), Nigeria's urban development and environmental sustainability, Nigeria's urban planning laws and policies, the relationship between urban planning and environmental incidences in Port Harcourt and the infrastructural deficit. It concludes by highlighting the link between urban planning and flooding and identifying the gaps in the literature.

2.2 The concept of sustainable development/sustainability

Sustainable development, also known as 'sustainability', is the theoretical and conceptual framework organizing this thesis. The terms sustainability and sustainable development are used interchangeably in this work, with both meaning: "Development that meets the needs of the present without compromising the ability of future generations to meet their own needs", which is the most widespread and accepted definition of sustainable development, adopted from the UN *Report of the World Commission on Environment and Development: Our Common Future*, known as the Brundtland Report after the Chair, Gro Harlem Brundtland (Brundtland Report, 1987: 37). This landmark report provides baseline features and agreement that surround the concept of sustainable development for all nations, whatever the country's status (developed or developing), and it views development as a continuous change to society with its objective being to provide the basic needs of humankind—primarily food, clothing and shelter—and fulfilling humankind's present needs while maintaining earth's integrity for both present and future generations. The two main underlying concepts of sustainable development in the report are 'limitations' and 'needs'. 'Limitations' refers to restrictions forced by human social organization and the state of technology on the ability of the world's environment to meet the needs of the present society and that of the future.

‘Needs’ refers to meeting the basic requirements of all people in society, particularly the poor; this is a priority for policy makers (Brundtland, 1987: 24-25).

Globally, anthropogenic environmental issues like climate change have been at the forefront of discussions on sustainable development given that the environment gives life to humankind and all living things. The environment has also experienced degradation from human activity to such an extent that action must be taken to curb environmentally destructive human behaviour or the ecosystem stands at risk of losing its biodiversity. The 1987 Brundtland report defined the concept of sustainability and its three bottom-line indices: social, economic and environment. Paragraph 71 of *Our Common Future* states:

> By the turn of the century, almost half of humanity will live in cities; the world of the 21st century will be a largely urban world. Over only 65 years, the developing world's urban population has increased tenfold, from around 100 million in 1920 to 1 billion today. In 1940, one person in 100 lived in a city of 1 million or more inhabitants; by 1980, one in 10 lived in such a city. Between 1985 and the year 2000, Third World cities could grow by another three quarters of a billion people. This suggests that the developing world must, over the next few years, increase by 65 per cent its capacity to produce and manage its urban infrastructure, services, and shelter merely to maintain today's often extremely inadequate conditions.

Paragraph 72 is also relevant to the focus of this research as it highlights the implications of increased urbanisation without appropriate planning insight in place:

> Few city governments in the developing world have the power, resources, and trained personnel to provide their rapidly growing populations with the land, services, and facilities needed for an adequate human life: clean water, sanitation, schools, and transport. The result is mushrooming illegal settlements with primitive facilities, increased overcrowding, and rampant disease linked to an unhealthy environment. Many cities in industrial countries also face problems - deteriorating infrastructure, environmental degradation, inner-city decay, and neighbourhood collapse. But with the means and resources to tackle this decline, the issue for most industrial countries is ultimately

> one of political and social choice. Developing countries are not in the same situation. They have a major urban crisis on their hands.

Sustainable development is thus viewed not as a static process but rather as a continuous change to society. The main objective of development is to provide the basic needs of humankind, which are primarily food, clothing and shelter (Brundtland, 1987). Sustainable development demands that in fulfilling any of humankind's present needs that negative impact on the natural ecosystem is kept to a minimum to maintain the earth's integrity for the present and future generation.

Another landmark event in 1992 contributed to raising the concept of sustainable development in popular consciousness. The 'Earth Summit' in Rio de Janeiro, Brazil, gave rise to 'Agenda 21', a non-binding action plan for achieving global sustainability. Agenda 21 has become a charter document for achieving sustainability in the 21st Century (Wheeler & Beatley, 2014). One of its key program areas towards achieving sustainable development in human settlements is the furthering of sustainable land-use planning and management (UNCED, 1992). This goal aims to make the land needs of human settlements available through a process of environmentally conscious land use planning to ensure all households have adequate access to land.

Within scholarly literature, there are many definitions of the concept of sustainable development. Wheeler (1996) identified nine common themes among them, as detailed in the table below.

Table 1: Wheeler's thematic groupings of definitions of sustainable development

Theme	Meaning
Meeting needs of future generations	Sustainability construed as meeting needs of the present generation while not compromising needs of future generation
Carrying capacity of the environment	Enhancing the quality of life of people while not exceeding the holding power of the supporting environment
Maintenance of the natural capital	Sustainable development is seen in this context as having a stock of environmental assets, not allowing natural capital to deplete or become out of stock.
Improvement and maintenance of systems	Sustainability as ensuring that diversity and productivity is maintained or improved upon.
Not worsening things	This definition of sustainable development refers to any positive act or change that does not break down the social, political or ecological system on which the ecosystem is dependent.
Satisfying human and ecological needs	Meeting human needs, achieving social justice and equity, maintaining cultural diversity and providing for social self-determination, integration of development and conservation while maintaining the integrity of the ecosystem.
Sustenance of human livelihood	Sustainability as the capacity of a system to support the living of the people who rely on it indefinitely
Resistance of rapid growth	Sustainability seen as an opposition to continued ascending material growth
Protection and restoration of the ecosystem	Sustainability seen as restoration, conservation and stewardship.

Source: Wheeler (1996: 12)

While the Brundtland Report (1987) provides a common understanding of sustainable development, Wheeler's (1996) analysis is important because it concisely and adequately captures the understandings and beliefs of the different schools of thoughts on the concept of sustainable development.

2.3 Contemporary urban planning policies and sustainability

Urban Planning, based on the widespread acceptance of the concept of sustainability has, over the years, sought to incorporate the tenets of sustainable development in various forms. Environmental concerns like global warming and other environmental mishaps have raised

awareness worldwide that urban planning, as a planning goal, can promote more sustainable land use practices (Beatley & Manning, 1997; Vitousek et. al. 1997). Numerous national and city plans incorporate the concept of sustainability at their core and in principle (Berke & Conroy, 2000).

Berke and Conroy (2000) outline six principles of sustainable development planning which are summarised below:

(i) Harmony with nature: This principle states that development practices must not disrupt the natural patterns and lifecycles of ecosystems but should rather act to support them. Instead of modifying natural systems, development should mimic natural systems to fit urban life. Activities should preserve natural systems, air quality, reduce flooding and promote sustainability.

(ii) Livable built environments: The fit between urban form and people should be enhanced by the creation of desirable spaces that will promote community cohesion and enhance land use access and urban form by promoting a sense of place and preserving physical features that are significant and promote attachment and sense of place for people.

(iii) Place based economy: The local economy should function within its own limits. Resources should be used no quicker than can be replaced and waste should not be discharged above the assimilable time limits. The built environment should meet local needs and aspirations with infrastructure and housing that promote livability and local economic affairs.

(iv) Equity: Land use patterns should incorporate the needs of the poor and should seek to eliminate disadvantages while promoting equitable access to economic and social facilities in a bid to eliminate poverty.

(v) Polluters pay: Polluters must bear the cost of their actions in consideration of the interests of the public.

(vi) Regionalism: Communities must consider the impact of their action or development on other communities and must not constitute any form of nuisance to other communities in the pursuit of their own goals.

In light of these six principles, Berke and Conroy (2000) asked how urban planners incorporate sustainable development. They found that while there is a broad acceptance of the concept of sustainable development, a gap exists as planners struggle to put the principles into practice. They also found that although plans focused on creating a more livable built environment, they lacked a comprehensive approach to guiding development towards sustainability. To this effect, they argued that the importance of the concept of sustainable development is widely accepted, however more work is needed to better align theory and practice.

The Brundtland (1987) report states that urbanization is itself a development process, with urban planning being instrumental to achieving and facilitating sustainability (UNCED, 1992: 45). The challenge of urbanization is effectively managing the process to circumvent a decline in the standard of life of people and promote sustainable land use practices (Satterthwaite, McGranahan, & Tacoli, 2010). Examples of effective urban planning include the development of smaller urban centres to ameliorate pressures in larger cities. Building self-supported housing and urban amenities by and for the poor, and instituting a more constructive strategy will enhance the grey economy and provide monetary support for basic services like sanitation, water supply etc. In this view, when adequate controls and planning are effective, urban development will help protect communities from environmental disasters rather than increasing their vulnerability. In Port Harcourt, for example, if sustainability had

effectively informed city planning, urban development would have helped avoid environmental disasters, the most common of which is flooding, which has caused enormous economic and social upheaval.

2.4 The flooding menace

Flooding is an impediment to a nation achieving its SDGs (Kundzewicz, 2002; Mathur, 2006). Unusually high rainfalls and a host of anthropogenic factors, such as land use practices and inadequate drainage, cause flooding (Bhavani et. al., 2008). Unlike disasters like earthquakes, where the magnitude has historically been measured on the Richter scale which gives an idea of the severity of the disaster, there is no quantitative scale for measuring the scale of flooding. A consequence of this is that a number of significant flood disasters do not receive adequate attention in the media, as is the case with the flooding in Port Harcourt. There are however several different types of flooding which have varying impacts and cause damage in diverse ways. Maddox (2014) has identified three common types of flooding:

Coastal flooding: Coastal floods or 'surge floods', take place in areas with surrounding oceans, seas and large bodies of open water. It is the effect of severe tidal conditions originating from inclement weather. Storm surges caused by strong winds from storms like hurricanes push sea water to the shore and cause coastal flooding. During coastal flooding, water overtakes/invades surrounding low-lying areas and the impact can be enormous in terms of property damage and loss of lives. There are three levels of coastal flooding—minor, moderate and major. During minor coastal flooding, beaches are eroded and no major damage occurs. Moderate coastal flooding occurrences inflict damage to some buildings and cause a considerable amount of beach erosion. During major coastal flooding there is enormous risk to lives and property and significant beach erosion occurs. Evacuations are often recommended.

Fluvial flooding: Also known as 'riverine flooding', a fluvial flood takes place when there is excessive rain over a long time period causing a river to overflow its banks. Heavy snow and ice melt can also trigger this type of flooding. The two types of fluvial flood are flash flooding and overbank flooding. Flash flooding is characterized by high velocity, intense water torrents filling river channels with little notice. The force of the water makes it very destructive and dangerous. Flash flooding is characterized by its short duration, with about six hours between the rains and the flooding. Overbank flooding occurs when water gradually overflows its banks. It is the more common form of fluvial flooding and can happen irrespective of the size of the water body.

Pluvial flooding: Pluvial flooding also known as 'surface water flood' occurs when heavy rainfall causes flooding independent of any nearby water body. It is a type of flooding that can occur in any area and demonstrates that flood risk is not restricted to areas located near rivers or oceans. Pluvial flooding can happen even in areas lying above river or coastal floodplains. The two common types of pluvial flooding occur when: (i) heavy rain overwhelms the existing drainage system and water overflows into surrounding inhabited areas; (ii) flowing water or run-off from rainfalls on hillsides or high areas that are unable to absorb the water, which then submerses lower lying areas. Urban flooding is a subset of pluvial flooding and forms the focus of this research. Urban flooding occurs in urban areas when flood waters take over usually dry urban lands and occurs in situations of prolonged or intense rainfall.

2.5 Flooding and urbanization in Africa

In terms of population increase, Africa is the fastest growing continent and is witnessing the world's fastest levels of urbanization (UN, 2016). While the global population is currently increasing, over the next 50 years there will be a global decline in population growth, except for Africa where the population will steadily continue to grow. Increasing birth rates and

rezoning of human settlements, as well as rural to urban migration and general population growth, are some of the factors driving this urban growth (Habitat, 2015). Africa's population pyramid has a wide base with many young people. While some parts of the world will have to contend with an aging population, Africa will have a more youthful populace. This presents both opportunities and challenges, based on the current levels of development. By 2050, it is predicted some 70% of the African population will reside in urban areas, despite these urban areas currently being characterized by their poor infrastructure, poor quality and unplanned housing, and informal settlements on flood and other hazard-prone areas. This will mean worse living conditions than at present, if the current population growth, urbanization and poor infrastructure remains (Chado, Johar, & Zayyanu, 2016; van Noorloos & Kloosterboer, 2018).

Sustainable urbanization can provide opportunities as urban centres are an agglomeration of people and economies. Sustainable infrastructure should ideally form the foundation of African cities, but currently this sector is largely deficient, giving rise to environmental problems like flooding (Olalekan, 2018; Satterthwaite, 2017). Flooding is a serious hazard and the biggest threat to Africa's sustainable development. Numerous African countries including Nigeria, Benin, Sudan, Senegal, Ghana, Burkina Faso, Zimbabwe, Ethiopia, Burundi, Kenya, Uganda, Rwanda, Tanzania, Algeria, Zambia have experienced severe floods within the last two decades (Lukamba, 2010). These disasters have not attracted global attention compared to the events such as Hurricane Katrina in the Southern United States, or the devastating tsunamis in the Indian Ocean or Japan (Kazeem, 2017).

Another problem is that annual urban flooding is often not recorded in disaster databases. Africa's urbanization is not in itself the problem, rather, there is a lack of planning and management to deal with urban expansion and growth that causes significant problems. The impact of climate change in these urban areas remain localized, but are widely unknown

because of a dearth of data and appropriate records and research, even at the local level (Adelekan et al., 2015). Continuous and frequent smaller scale flooding disasters have a very serious impact on the population and places because they face floods on an annual basis. African countries experience different types of flooding as follows: localised flooding, caused by poor (or a total lack of) drainage; small stream flooding, as a result of blocked or inadequate culverts; major river flooding, worsened by changing land use practices such as encroachment of the growing population into floodplains; and rainy season flooding worsened by poor sanitation practices like indiscriminate dumping of refuse around living areas (Bhattacharya & Lamond, 2011).

Limited responses by the authorities to flood risk, as well as during flooding events, means people are usually left to fend for themselves. The flooding and attendant damage is dependent on the level of exposure to the hazard and vulnerability to the floods. Over half of Africa's cities are either within, or have areas within, low-lying coastal areas. Big cities like Cotonou, Alexandria, Dar-es-Salam, Mombasa, Maputo and the mega city of Lagos are examples of big cities in low-lying coastal areas (Hardoy, Johnson, & Satterthwaite, 2012). The flooding vulnerability and exposure factors are increasing due to population growth and associated urbanization putting more people at risk (Jha et al., 2011).

The flood-risk exposure of African cities is likely to increase further due to climate change (Baker, 2012). Heavy and intense rainfall is often causing rivers to overflow their banks and flood nearby living areas, wreaking havoc. In the urban areas of Africa, anthropogenic modifications increase risks from pluvial and fluvial flooding. The African urban poor are largely the mostly affected by the risks posed by flooding as they live in areas with informal dwellings synonymous with urban sprawl (Salami, von Meding, & Giggins, 2017). In the Nigerian city of Ibadan for example, most of the poor are situated in congested areas with

poor housing that is mostly unfit for human habitation, and next to no infrastructure. In such areas when it rains heavily, flooding is guaranteed (Salami et al., 2017).

The pace and level of development in numerous African urban areas exceeds the planning capacity (Frick-Trzebitzky & Bruns, 2017). When combined with other factors like population growth, poor economic conditions and environmental degradation, it poses a significant challenge. Despite the challenges faced by African urban centres, there is little known on how the prevalent pattern of urban development influence these risks, which is important knowledge (Dodman et.al, 2017).

2.6 Flooding and the Sustainable Development Goals (SDGs)

Nigeria is by no means a poor country, yet paradoxically, it has overtaken India (with its population of 1.4 billion) as the nation with the largest number of poor people. Some 87 million Nigerians out of a population of 200 million now live in extreme poverty (Homi Kharas, 2018). Environmental problems like floods exacerbate the living conditions of the already poor in Africa's most populous country and pose a threat to Nigeria achieving the UN SDGs. Specific goals affected include SDG 1: No poverty; SDG 2: Zero hunger; SDG 3: Good Health and Wellbeing; SDG 4: Quality education; SDG 6: Clean water and Sanitation; SDG 8: Decent work and economic growth; SDG 11: Sustainable cities and communities; and SDG 15: Life on land. The chance of attaining the SDGs is directly impacted by the floods that destroy property and the people's means of livelihood. As floods have become an annual occurrence, poverty is further entrenched.

Flooded communities do not make sustainable human settlements but are a good breeding ground for mosquitoes that cause the spread of deadly Malaria. Inundation also fosters disease outbreaks like Cholera. Annually, a good number of residents of Port Harcourt are displaced for periods of up to six months due to flooding (Akukwe & Ogbodo, 2015; Ikechukwu, 2015). During these displacements, most of the school age children go without

formal education. This is because their schools also get flooded, and also because in the relocation areas, some of parents cannot afford to enrol their children in new schools because of the attendant costs.

Floods also degrade the environment. In terms of the impact of flooding on poverty, there is a two-way reinforcing relationship—flooding worsens existing poverty and poverty makes the impact of flooding much more severe by increasing vulnerability. They both decrease the living standards of people affected and impede development progress, especially among the worse-off members of the society (Dube et al., 2018a).

According to Dasgupta (2007), floods have the capacity to destroy the social capital of people and environment, as well as depleting the few savings of already poor households. Human capital is also impacted as during floods, people are at risk of physical injuries and ill-health. In Africa, poverty is worsening as seen in the increased incidence of disease and hunger, decreased life expectancy, and low per capita income. All these factors combine to increase vulnerability to disasters like flooding because the people are already living in risk-prone areas (Dube et al., 2018a). The relationship of flooding and poverty thus deserves closer attention as when such floods become a frequent occurrence, the effects are compounded. The impact of floods on the poor is strongest in the immediate aftermath of occurrences, and it remains very significant in the long term. The disadvantages of poor people manifest heavily when disasters occur, leading to further problems (Chanda Shimi et. al., 2010).

The destruction of crops and seedling stores during flooding reduces harvest and impacts the next planting seasons, culminating in food shortages. Food becomes scarce in the market and the forces of demand and supply come into play, increasing food prices beyond what the poor can afford. Floods therefore have a chain reaction effect and represent a threat to food security by affecting production and supply of food, mostly in the poor countries of the global

south (Armah et. al., 2010). Farming communities suffer more not only because they lose income, but also because they lack the cash to purchase other food and non-food items they need. Inundated farmlands are unsuitable for cultivation, and livestock are not spared during floods. Depending on the type of sediments deposited on farmlands during floods, some land can be rendered uncultivatable for a period creating a cycle of food scarcity and hunger (Armah et al., 2010).

Most African countries do not have a social security net and there is no other source of income except agriculture, so people are exposed to starvation and hunger. Flooding thus has both direct and indirect impacts on health (Minamiguchi, 2008). Increased deaths and injury are direct effects of flooding with over 90% of these direct effects occurring in developing countries. Pollutants like insecticides and pesticides, animal and human faces, sewage, fertilizers and other contaminants are rife in floodwaters which also carry disease causing micro-organisms (Oriji, 2015). Disease incidence associated with flooding also means that manpower availability is limited as a sick person cannot contribute to the labour force. The contact of contaminated waters with agricultural crops and food items elsewhere makes food unsafe for human and animal consumption. Power outages are also common during flooding disasters and this affects food stored in the home and may cause serious health threats (DFTE, 2017).

During floods, water sources can become polluted. The ground becomes waterlogged and wastewater and sewage treatment plants become overburdened with the contaminated floodwaters causing backflow into homes and lower lying surroundings. Floods also cause a rise in the groundwater level which reduces the efficacy of the natural water purification process and increases risk of infections and vulnerability to dangerous chemicals (UN, 2010). Contaminants rife during flooding include micro-organisms like bacteria, as well as chemicals, sewage, industrial waste etc that can lead to illnesses and death (Sun et al., 2016).

Private septic tanks and wells which are common in developing countries overfill with polluted water and become cesspools for disease and infection. All these conditions usually result in life-threatening disease epidemics like typhoid, cholera and dysentery, as has been seen in many countries in sub-Saharan Africa (Okaka & Odhiambo, 2018; Rieckmann et. al., 2018). Flooded homes provide a good damp environment for mildews and moulds to grow, which triggers upper respiratory tract illnesses for people who have allergies, and episodes for asthma patients. Such health problems mostly affect the elderly and children.

Physical and emotional trauma is also triggered by floods (Tong, 2017). Long-term psychological distress, even years after flooding, is very common. Access to medical facilities and treatment is also greatly hampered in flooding disasters and this is felt more in developing countries (Chanda Shimi et al., 2010).

Flooding disasters undermine and disrupt the education of children (Mudavanhu, 2014). In the developing world there are numerous campaigns to promote universal basic education, however children in disaster areas become educationally disadvantaged at the crucial school age, which sets them up for continued economic disadvantage and opportunities later in life (Ardales Jr et.al., 2016). During floods many or all educational infrastructure and materials are destroyed, and even after the floods recede or the waters dry up, there are longer-term effects in the education system because they are not easy to replace, especially in developing countries. Longer-term impacts on education can result from student illnesses caused by flooding, displacements and injuries. There is also evidence of overall poorer educational performances and outcomes, reduced level of educational levels, and general disadvantages that continue into adulthood (Erica, Jessie, & Stephanie, 2018).

The effect of flooding on the education of young school children is much more profound in the areas that experience annual flooding on a scale that it is not classified as a major disaster,

such as in Port Harcourt, because these children lose many months of school every year. Also, disasters like floods bring severe hardship to poor families who might be forced to withdraw their children totally from school and push them into the labor market to work to help provide for their family's basic needs, bringing a halt to their formal education (Kousky, 2016).

Floods destroy people's means of livelihood. In a flood impact study by Mwape (2009) in Sikaunzwe community in Zambia, 94% of respondents who were primarily farmers had their farms devasted by floods, providing an insight into the high vulnerability of farming families. A significant proportion of different forms of assets were lost to the floods, including both productive assets like fishing and farming equipment, as well as non-productive assets such as furniture, electronics and clothing. Loss of income was experienced by flood victims as their sources of livelihoods which yields household income were affected.

Sardar, Javed, and Amir-ud-Din (2016) found that property damage is the most pronounced economic aftermath of floods. The diversion of resources to reconstruction and rehabilitation tasks clog the wheels of economic growth. The economic impact of flooding goes beyond the short-term and usually extends beyond the affected region (Jongman, 2018). For example, in Thailand after severe flooding, the GDP increased by just 0.1% in 2011 compared to a 7.8% increase in 2010 (Hammond et.al., 2015).

Illnesses caused by flooding also affects the economy, and a Cost-of-illness (COI) method is commonly applied to determine the economic effects. The COI approach looks at the indirect and direct impact of disease on the economy, and indices include cost of medical care (diagnosis, medication, procedures, in-patient and out-patient care etc), non-direct medical costs like transportation for treatment and care, non-personal costs for instance information, research and communication, education etc, and income losses due to illness (Jo, 2014).

Flooding can also affect city infrastructure as services can be interconnected—for example, water supply and electricity are usually connected, thus electricity outage can affect telecommunications and interrupt water supply. The geographical effect of such network interruptions often reaches far beyond the immediate affected areas (Hammond et al., 2015).

Finally, floods impact the natural flora and fauna of an ecosystem. Flood waters destroy land by striping soils and eroding shorelines, taking out the natural vegetative cover in its path (Smith, 2017). The hazardous conditions caused by floods poses a threat to every form of life (plants and animals). The fact that water systems are also contaminated is a hazard to life. It is not uncommon to lose farmlands, livestock and human life during flood events. For instance, the 2019 Queensland floods saw over 300,000 cattle destroyed at a cost of over AUD$3,000,000 (Dunn, 2019). There was also an outbreak of soil-borne diseases like Melioidosis which led to a loss of life in the flooding disaster. Wildlife like kangaroos and birds were not spared either in the Queensland floods (Chow, 2019). Recovery is predicted to take years. In Africa, floods cost Mozambique (one of the world's poorest countries) US$50Million in 2013, the equivalent of 9% of its GDP. In Tanzania, cost of flooding is US$2Billion annually while the cost of the 2012 floods in Nigeria has been estimated as US$10Billion (Olalekan, 2018).

2.7 Nigeria's Urban development and environmental sustainability

In Nigeria, flooding is the most common environmental disaster which impacts environmental sustainability. Nigerian cities are experiencing environmental deterioration and are ranked as among the least liveable cities in the world (Daramola & Ibem, 2010). Flooding is not however a problem peculiar to Nigeria as many of the urban poor in other African countries face increasing problems from severe flooding (Douglas et al., 2008).

Climate change alone cannot however be blamed for all flooding disasters as governments have a key role to play in controlling disasters by putting the necessary infrastructure in place

as a control measure (Satterthwaite, 2013). A number of researchers have sought to establish a link between planning policy, urban development and environmental damage in Nigeria. Environmental law, which aims to protect the environment, and environmental justice, which is geared toward achieving environmental sustainability, have both omitted the built environment in their frameworks. This has led to a poor application of environmental law in Nigeria (Allu, 2016). By contrast, both developed and even some developing nations like Brazil and Peru have been able to mainstream both environmental law and environmental justice in their own development, and this has led to better articulation and results. This is an important discussion because it highlights how Nigeria's environmental regulatory framework has failed to recognize the built environment as a large problem from which the biggest environmental threats can emanate.

Rapid city expansion and resulting environmental problems emanating from urbanization and population growth are being better managed by developed countries, whereas in developing countries, high population, limited resources and poor administration are major roadblocks. In Nigeria for example there is no articulation between legislation or policy that dictates indices or guidelines for achieving environmental sustainability (Ishaya, Dabo, & Fadason, 2016). Environmental issues are thus a major constraint to achieving sustainability (Ghalib, Qadir, & Ahmad, 2017).

Ihuah and Eaton (2014) identified a policy gap as a cause of failure and advocate a set of seven factors that must be tackled together in the Nigerian context to achieve sustainability in the built environment: (1) Policy support; (2) economic and finance; (3) management structure;(4) technological; (5) environmental; (6) community perception; (7) monitoring, evaluation and reporting. Along similar lines, and to promote sustainability in Nigeria's built environment, Momoh (2016) developed a tool—Sustainable Composite Cities Environmental Evaluation and Design Tool Neighbourhood Design (SUCEED ND)—which aimed to

contribute to and enhance present planning practices. Sustainable urbanism can be achieved using environmental assessment methods side-by-side with other supporting techniques (Momoh, 2016). The traditional urban planning framework, its administration, and the associated master planning which still dominate planning in Nigeria, have not adequately ensured environmental sustainability. The current planning system is virtually a colonial legacy, and does not sufficiently respond to the ever-evolving changes in social, cultural, and economic developments and, thus, the spatial impact on residential land use (Ogu, 1999). Planning methods that encourage grassroots consultation, education, mobilization and participation will go a long way in solving sustainability problems.

Good governance and the regulatory authorities also have a key role in promoting environmental sustainability in Nigeria as good governance can reverse the loss of environmental resources and sustain environmental development (Oyefara, 2013). There is a link between land use planning and urban growth, which has an impact on sustainability (Dyachia et.al., 2017). Uncontrolled urban expansion, especially a lack of coordination between land use planning and urban growth, has led to a range of environmental issues in Nigeria, however better urban planning can attempt to mitigate against environmental problems. There is strong agreement among researchers on the need to utilize modern planning concepts and community involvement to control the flooding problem. Modern concepts of land use planning like collaborative and sustainable planning, which is flexible, and involves the public, and integrates environmental issues should be adopted and take the lead in the urban growth process (Dyachia et al., 2017; Lagopoulos, 2018; Oyefara, 2013).

2.7.1 Port Harcourt's urban development

At least 49.0% of Nigerians live in urban areas today (Oni-Jimoh et al., 2018), including in the rapidly expanding sprawl of Port Harcourt. The human population in Port Harcourt is growing with housing developments being built to cater to the city's growing urban

population. Significantly, most of Port Harcourt's development has been criticized for being unplanned and unregulated (Wizor, 2014a). Three decades later, the predicted urban crisis of the Bruntdland (1987) report is now a reality for Port Harcourt city where unplanned growth and population increases have led to unprecedented environmental degradation (Uyigue & Agho, 2007).

2.8 Urban planning regulations and policies

The aim of urban regulations and policies is to control and guide urbanization in order to prevent problems associated with the growth of cities, and to harness the benefits that come from expansion (Habitat, 2016). This is not the case in Nigeria where the government often fails or is slow to uphold law and environmental concerns as the country is urbanised (Eneh, 2011). This is apparent in the Ogoniland Clean-up Project,[1] which finally commenced in 2017 after many years of environmental damage from at least 2976 oil spills caused environmental degradation, and negatively impacted people's livelihoods (Collins, 2019). The sluggish pace of the Clean-up Project has been criticized in many quarters (Seun, 2018) and the excitement of the people at the launch of the project has ebbed considerably as nothing significant has yet been done. Indeed, there are doubts the goals of the Clean-up Project will ever be achieved (Orji, 2019).

Of particular concern are new housing developments, city infrastructure, and land use decisions that do not incorporate the tenets of sustainable development (See Chapters Four and Five for a detailed discussion). Development in everyday sectors like housing and infrastructure continue to be taken seriously in developed countries, as well as some other

[1] Ogoniland is an important part of the Niger Delta region in Nigeria. very rich in oil resources, but heavily polluted from the operations of the multinational oil giant, the Royal Dutch Shell Company. The pollution occurred over many years and has seen meant the primary occupations of the people (farming and fishing) have been mostly lost, and access to drinking water has become very difficult. In 2011 UNEP published a report on the extent of environmental damage, noting it would take about 30 years to clean up the almost 3,000 oil spills, and called for immediate commencement of cleanup. https://www.foei.org/news/oil-spills-ogoniland-nigeria-shell.

developing countries, that have a clear growth and development pathway (Gurara et.al. 2018). By contrast in Nigeria, these sectors have been almost totally ignored. The fact remains that for sustainability to be achieved, the built environment must come to the forefront of urban planning, given that it is the activities of the built environment that have the most impact on the environment as a whole. For the economic and social aspects of sustainability to be achieved, people must inhabit an environment that will enable them to thrive and be in good health; only then will other goals be realized (Hawkins, 2010).

The importance of land-use planning as an integral process of achieving sustainability is well documented in literature. For instance, Agenda 21 highlighted land-use planning as a tool to be utilized in preventing urban sprawl, most especially into important farming land and sensitive regions. There is a call for all nations to undertake reviews of the urbanization policies and processes. This will enable an understanding of the impact of growth on the environment and facilitate the application of unique planning styles and approaches, tailor-made to local needs, that also consider the features of the growing cities and the available resources (Birch, 2016; Caprotti et al., 2017).

2.9 Nigeria's Urban planning laws and policies

The planning law used in all the states in Nigeria is the Nigerian Urban and Regional Planning Act (Decree 88 1992). This replaced the British colonial government's 1946 Town Planning Ordinance (Dung-Gwom, 2011).The three tiers of government in Nigeria (federal, state and local) are all involved in urban planning in different capacities. The federal level is tasked with roles such as: formulating national policies relating to urban and regional development and planning; devising and implementation of the National Physical Development and Regional Plans; providing financial and technical assistance to states in devising and implementing plans; as well as promoting the training and education of planners. The state government is tasked with formulating its own state policy for planning,

which has to be within the stipulations of the national policy. The state also prepares and implements its regional, sub-regional, and urban plans as well as subject plans, and provides technical support and assistance to local government in the local government's implementation of local, rural and subject plans. The local government, which includes a city council, prepares its own town plan, rural area plan, local plan and subject plan. The local government also controls development within its own area of jurisdiction.

The Act requires that a National Urban and Regional Planning Commission, made up of members who are professionals with a number of years of experience in the different fields of urban planning, is constituted at the federal level. The different government ministries and parastatals involved in planning in different capacities each have representatives on this body. This commission is tasked with carrying out the planning functions at the federal level. A state board is constituted which is in-charge of state planning activities. A local planning authority is in-charge of planning at the local level and its members are all planning professionals.

Before the preparation of the National Plans, the National Commission is obliged to call for contributions from all concerned government and non-governmental establishments and members of the public whose input will be considered in the draft preparation. This is in a bid to achieve integration between all levels of the Physical Development Plans in Nigeria as well as to encourage community participation. The draft plan is presented to the public and objections are welcome and addressed before the final plan is presented to the legislature, which may either approve it in whole or in part, or ask for amendments. The approved plan becomes the operative National Physical Development Plan, and shall be reviewed every five years to reflect the changing times. The review process follows the same process as the original plan.

In making the regional, sub-regional and urban/master plans, this same procedure is adopted with relevant changes. The making of a town plan, rural plan, local plan and subject plan must also be in tandem with the state plans. A Development Control Board in-charge of all developments within their jurisdiction is established at each level of government. Every developer, both government and private, must submit plans (comprising all relevant information like drawings, designs, plans) for approval from the relevant control board before any physical construction can commence. There are various grounds for rejecting plans, including if the proposed development will have a major impact on the environment, inhabitants or existing facilities. A detailed Environment Impact Assessment is to be submitted by any developer wishing to make developments of three hectares of land expanse or recreational and commercial buildings of stipulated sizes. Rivers State, of which Port Harcourt is the capital, has in place the Rivers State Physical Planning act of 2003 as well as the Greater Port-Harcourt City Development Authority (GPHCDA) Law No. 2 of 2009 in place to regulate urban planning in the State (Ede, Owei, & Akarolo, 2011).

The Nigerian Urban and Regional Planning Act (Decree 88 1992) compares to global standards, but the adoption in practice at all levels of government leaves a lot to be desired. Non-compliance to laws and policies has been identified as a problem of the Nigerian urban built environment, one which has led to many environmental problems (Olugbenga & Adekemi, 2014). Citizens are encouraged to contribute but the culture of participation is not deep, and the government itself does not obey its own laws. There are cases where Governors themselves decide where to site facilities without recourse to due processes provided by the law (Dung-Gwom, 2011; Osuocha & Njoku, 2012). Citizen non-participation is thus a contributory factor to the problems being experienced in Urban planning in Nigeria (Chado et al., 2016).

2.10 The relationship between urban planning and environmental incidences in Port Harcourt

Port Harcourt is experiencing multiple environmental problems, the majority of which link to urban planning (Ibama & Wocha, 2017; Izeogu, 2018). These problems range from oil spills as a result of crude exploration, to air pollution as a result of soot from illegal crude refining (which has seen a massive social media protest calling the government to action), to the annual flooding experienced in a number of suburbs and the city centre (Akinwale, 2018; Elenwo & Ugwu, 2018; Yomi, 2017). These floods pose the greatest threat as it displaces residents, cause loss of lives, wreak huge economic losses, and livelihood losses (Oriji, 2015). The flooding has become a yearly occurrence and homes in a number of suburbs in Port Harcourt are inundated as soon as the rainy season starts, continuing the devastating annual cycle (Edozie, 2018). The incessant urban flooding is a stumbling block to achieving the SDGs, and prevention, mitigation and preparedness are ways of tackling the flooding problems (Bashir et. al., 2012).

A number of studies have established a relationship between the annual floods and Port Harcourt's urban planning. Ogundele and Jegede (2011) in their research examining the factors that cause the flooding also highlighted the planning issues of poor construction and coordination of drainage systems as the root cause of the problem and called for better land use planning to control the floods.

The impact of floods is more pronounced in low-lying areas due to rapid growth in population, poor governance and decaying infrastructure. Research has identified the causative factors to be a lack of proper environmental planning, urban management, and collaborations between local communities, NGOs, voluntary groups, local and international donor organizations towards managing floods (Ibama & Wocha, 2017). Within the realm of professional practice (land use planning and management), it has been recommended that

professionals undergo training and re-training programmes in related fields (human capacity development) and uphold the ethics of their profession, particularly avoiding corrupt planning practices that can jeopardize lives and properties of the people. Political intervention in land use planning and management has been decried as inimical to sustainable urban planning, and is to be avoided in order to prevent the occurrence of avoidable disasters (Dung-Gwom, 2011).

In another study examining the impact of flooding, vulnerability factors and disaster risk management by Onwuemele (2012), construction on flood plains, excessive rainfall due to climate change, deforestation and indiscriminate dumping of refuse were also identified as causative factors of flooding in Nigeria. The preparedness of concerned agencies to act during disasters was found by Onwumele (2012) to be grossly inadequate. Funding is an issue and relief efforts take years to kick off and in a lot of cases, fail to kick-off. For example, as at 2015, the victims of the 2012 floods in Nigeria were yet to be given houses promised them by the government (Adekola & Lamond, 2018).

It is a fact that climate change has triggered extreme rainfall which contribute to the flooding menace which has a chain reaction effect (Hettiarachchi, Wasko, & Sharma, 2018). Climate change induced flooding destroys farmers' harvest, contributing to hunger and jeopardizing the nation's path to sustainable development (Kwari, Paul, & Shekarau, 2015). There have been calls for planning laws to be reviewed to suit today's realities, and for a building code to be adopted and enforced in all states. Co-operation between concerned ministries and sensitization starting from the primary school level is also important (Kwari et al., 2015).

Flooding has primarily been blamed on increased levels of urbanization, a lack of or inadequate drainage systems and lax planning laws. This is because increased urbanization has seen a growing proportion of ground surfaces concreted, which means there is no

percolation of water, and adequate drains are not in place to take care of the surface runoff (Adeloye & Rustum, 2011). Designing and building a "sustainable drainage system" (or "suds") as practised in the United Kingdom, has been identified as a way of controlling the flooding. The flooding has also been blamed on government agencies charged with city development, with claims they are not doing their job, and a review of the city master plan with sustainable drainage recommended (Elenwo & Efe, 2014). The flooding in Port Harcourt has put lives at risk and residents have experienced extensive damage to properties, as well as loss of livelihoods. There is a strong consensus among academics on the link between planning, or the lack thereof, and flooding in Nigeria.

2.11 The infrastructural deficit

Insufficient investment in sustainable infrastructure is a constraint to development and growth (Bhattacharya, Oppenheim, & Stern, 2015). Flooding has become more frequent and intense than in decades past, and is now often occurring in locations previously not at risk. The insufficient infrastructure in Nigerian cities has made the rainy season become a period of worry for residents due to flood risk. Studies have also highlighted that the government is doing little to address these issues as it has not provided the necessary infrastructure (Douglas et al., 2008). In a research study that aimed to evaluate the impact of flooding on socio-economic activities in a Nigerian state, there was evidence of impact on the available infrastructure and the poor were found to be disproportionately impacted by the flooding disaster (Otomofa, Okafor, & Obienusi, 2015).

Nigeria's flooding is caused by an interrelationship of socio-political factors like governance/ management, and poor infrastructure (Adekola & Lamond, 2018). The country's growing population has seen an increase in the need for housing leading to expansion of its old cities and the formation of urban sprawl without the requisite infrastructure (Chiadikobi et.al., 2011). An evaluation of the sustainability of these new developments is required because

poor infrastructure is a hallmark of Nigeria's urban areas and the leading cause of the attendant problems associated with urban sprawl (Innocent, 2013; Lamond et. al., 2015). In addition, heavy rainfall, structural failures and other anthropogenic factors are flood drivers in Nigeria. Weak institutional frameworks in management and monitoring of the urban habitat is also an enabler of the flooding problem (Agbola et.al., 2012).

Even though urban floods have become a worldwide phenomenon, management practices differ among countries and vary in relation to existing technologies, infrastructure and urban planning levels (Hula & Udoh, 2015). In the case of Port Harcourt city there is evidence of planning failures in the provision of infrastructure, especially in the fringe areas, and the resultant yearly flooding that occurs. The lack of provision for drainage is one of the main causes of urban flooding in African urban areas. There is a pressing need to address town planning issues and construct drainage systems to combat the floods (Etuonovbe, 2011). Nigeria's failure to adopt an integrated approach to risk reduction, as is the practice in most countries of the world, does not augur well for her. Many parts of the world integrate spatial planning as a way of reducing flood risks.

For any city, the scale of the risk from extreme weather events is heavily dependent on the quality of existing infrastructure. Most residential areas in poorly governed cities in Africa have no drainage system and rely on natural drainage channels, and it is common for buildings and other infrastructure to be constructed in a manner that actually obstructs these drainage channels, and which results in flooding (Nabegu, 2014). There is evidence of increased deaths and fatalities from flooding in urban areas, and the poor suffer the most from such events (Douglas et al., 2008). With regards to urban sustainability, when adequate planning and infrastructure is in place, the floods will be controlled and its attendant negative impacts will be eliminated, bringing Nigeria a step closer to achieving its SDGs.

This literature review has shown that poor urban governance and a dearth of infrastructure are the leading causes of Nigeria's flooding disasters. Nigeria's flooding problem is thus mainly anthropogenic in nature. It stems from human interaction with the environment, and is largely a result of poor urban development (Omoboye & Festus, 2014). It is this human-induced flooding that forms the scope of this research.

2.12 Conclusions

A review of the wider literature strongly suggests the flooding being experienced in Nigeria, and more specifically in Port Harcourt city, is largely linked to poor urban planning. In the flooding literature, emphasis is laid on designing and planning for living with floods (Priest et al., 2016) but there is evidence that better urban planning can mitigate the Nigerian flooding problem, so residents will not need to learn to adapt to living with floods in the majority of the impacted areas. This chapter has identified a strong link between urban planning (of which weak infrastructural base is one component) and flooding, as well as the socio-economic impact of floods on people. The literature review has revealed there has been no research conducted on the problem of flooding by engaging with urban planners in impacted cities to understand the drivers of the flooding. This research therefore aims to investigate their professional understanding of sustainable development, and to seek their opinions on ways to mitigate the flooding. This is crucial knowledge that has the potential to improve a serious problem, and to contribute to the literature and available knowledge. The next chapter explains the thesis methodology and outlines in detail the analytical framework that informs this study.

Chapter Three: Methodology

3.1 Introduction

This thesis investigates the link between urban planning, sustainability and the flooding being experienced in Port Harcourt city, Nigeria from the perspective of urban planners. This perspective has not been explored previously and has the potential to make relevant stakeholders like the government and development organizations pay more attention to the flooding problem in Port Harcourt. Chapter Two demonstrated the ways in which the flooding problem in Port Harcourt poses a significant threat to human wellbeing and the achievement of sustainable development in Nigeria. This chapter outlines the methodological framework that informed the data collection and analysis of this study. It first discusses the methodology and methods, the case study site, researcher positionality, participant recruitment, data collection methods, ethical considerations, analysing and interpreting of data, triangulation, and scope and limitations of the study.

3.2 Methodology

A social constructivist epistemological stance shaped this study. Social constructivists believe that reality is both intersubjectively contrived and individually constructed within a specific social setting (Plack, 2005). This worldview satisfies the objectives of this research which set out to investigate the understanding of urban planning professionals on the link between planning, sustainability and the flooding problem in Port Harcourt city.

3.2.1 A qualitative research approach

A qualitative research approach was adopted because qualitative research views knowledge as inherent in individual experiences and enables understanding of a given topic or research question from the 'standpoint' of the local population involved in the study. The approach allows a nuanced exploration of research participants' experiences, and perspectives, and of how they construct meaning from a particular phenomenon (Atieno, 2009; Teherani et.al.,

2015). A qualitative approach thus enabled a deep understanding of how urban planners understood Port Harcourt's flooding problem at a particular point in time during fieldwork, and ascribed meanings or interpretations to it.

The qualitative research approach is interpretive, dynamic, fluid and evolving in nature. Key features of qualitative interpretive research include acknowledging of multiple subjective realities and dynamic socially constructed meanings which evolve over time (Munkvold & Bygstad, 2016). Qualitative research also allows for flexibility in the development of questions (Liamputtong, 2009). A qualitative research approach is suited to obtaining culturally peculiar knowledge pertaining to the social contexts, as well as the behaviours, opinions and values of the studied population (Mack, 2005). Another key feature of qualitative research is inductive analysis of data which utilizes the raw data to generate themes and concepts based on the researcher's interpretations of the original data. This inductive approach allows the data to speak for itself without bias from rigid methodologies and as such, a clear relationship is established between the study objectives and findings drawn from the data which become demonstratable and justifiable (Thomas, 2006).

3.2.2 An interpretative phenomenological research method

Interpretative phenomenological analysis (IPA), is a qualitative research method that examines data to analyse nuances and details of the experiences of a small number of participants and emphasises the divergence and convergence of their understandings. It allows researchers to examine in detail how people conceptualize phenomena to interpret and situate participants' understandings of the phenomena (Tuffour, 2017). IPA is ideal for studies that involve a homogenous sample (Larkin, Shaw, & Flowers, 2019). It was particularly useful in the context of this study to examine the views of urban planners in Port Harcourt who hold different roles within, and in relationship to, the urban planning process in the city. The goal of IPA is to explore in detail, an area of concern.

This approach aligns with the aims of this exploratory study; it also enabled the generation of rich narratives from urban planners to elucidate a complex setting and the complex interactions between the various actors within it. Further, this approach allowed the urban planners in this study to express their views and perspectives rather than conforming to categories and terms imposed on them by others. Specifically, one-on-one in-depth semi-structured interviews with urban planners were used to explore how they conceptualise their role in relation to flooding and enabled a deep understanding of the intersections between urban planning and sustainable development broadly, and to flooding specifically.

Developing a logical and rigorous research design is key and concerns all aspects of the study. In qualitative research, the design involves formulating a general approach to the study, which could be a case study, ethnography, action research etc., reviewing relevant literature, as well as adopting guiding theories and philosophical assumptions specific to the study which may be implicit or explicit, and adopting a format for reporting the study (Creswell & Poth, 2017). Establishing a clear-cut research design is important because it ensures that the evidence or data obtained will enable the researcher to answer the research question(s) adequately. Also, the same study could be carried out in different ways depending on the traditional leaning of the researcher. For instance, a cultural anthropologist could design the same study differently from an ethnographer, and because of this reason, I have adopted a case study design as it was determined as the most appropriate method to reasonably answer the research questions within the project timeline.

3.2.3 Case Study

Case study, as a multi-faceted form of qualitative investigation is ideally suited for a deep analysis of a multiplex issue in context, particularly where there is an unclear demarcation between an issue that contains numerous variables (Gerring & McDermott, 2007). In the context of the Port Harcourt flooding problem, multiple variables have been highlighted as

possible contributors to the flooding problem as discussed in the Literature Review (see Chapter Two).

Case study is used when one seeks to intentionally cover contextual conditions believing them to be relevant to the phenomenon of study (Yin, 2009). Case study research involves an extensive study where fieldwork is inherent to the study process and researcher subjectivity is a core feature that differs depending on the aim, methods and philosophical underpinning of the research work. Choosing the case is dependent on the conditions and aim of the research and involves decision making concerning settings, people, events etc. Case study research varies in scope and could be single, multiple or within case studies. Given that this research studies involved only Port Harcourt city, the single case study design was adopted. There are numerous ways of collecting data and analysing data, and triangulation is commonly utilized and valuable in case studies (Harrison et.al., 2017). Case studies can also be exploratory, descriptive, illustrative, explanatory or evaluative. In this research, the exploratory case study design was most ideally suited to this study, firstly because of the nature of this research which sought to answer 'how' and 'what' questions, and secondly because there is no clear or single set of outcomes in the phenomena being investigated (Yin, 2009).

In this case study, Port Harcourt was chosen because I was familiar with the settings, events and people of the city as it was my home for many years. This gave me insider insights and also posed challenges because it presented issues of bias that are addressed below (see Section 3.3 on Researcher Positionality). The case study research varies in scope and could be single, multiple or within case studies.

The case study method has numerous strengths. These include investigation of a problem in detail, offering in-depth explanations and discerning patterns, studying and examining different angles of the issue within its environment and offering a holistic overview of a

phenomenon (Ebneyamini & Sadeghi Moghadam, 2018; Idowu, 2016). It also produces findings that can be transferable to similar cases (Ponelis, 2015). Limitations of a case study approach include difficulty in replication and non-generalizability of findings to the general population. However, there are contentions that the limitations of the case study research method are not deep-seated, but provide opportunities to further improve the method (Idowu, 2016). The strengths of the case study approach appealed to this study most specifically because the findings could be transferrable to other Nigerian cities facing this flooding problem and explored further with urban planners in other Nigerian cities.

3.2.4 The Case Study Site

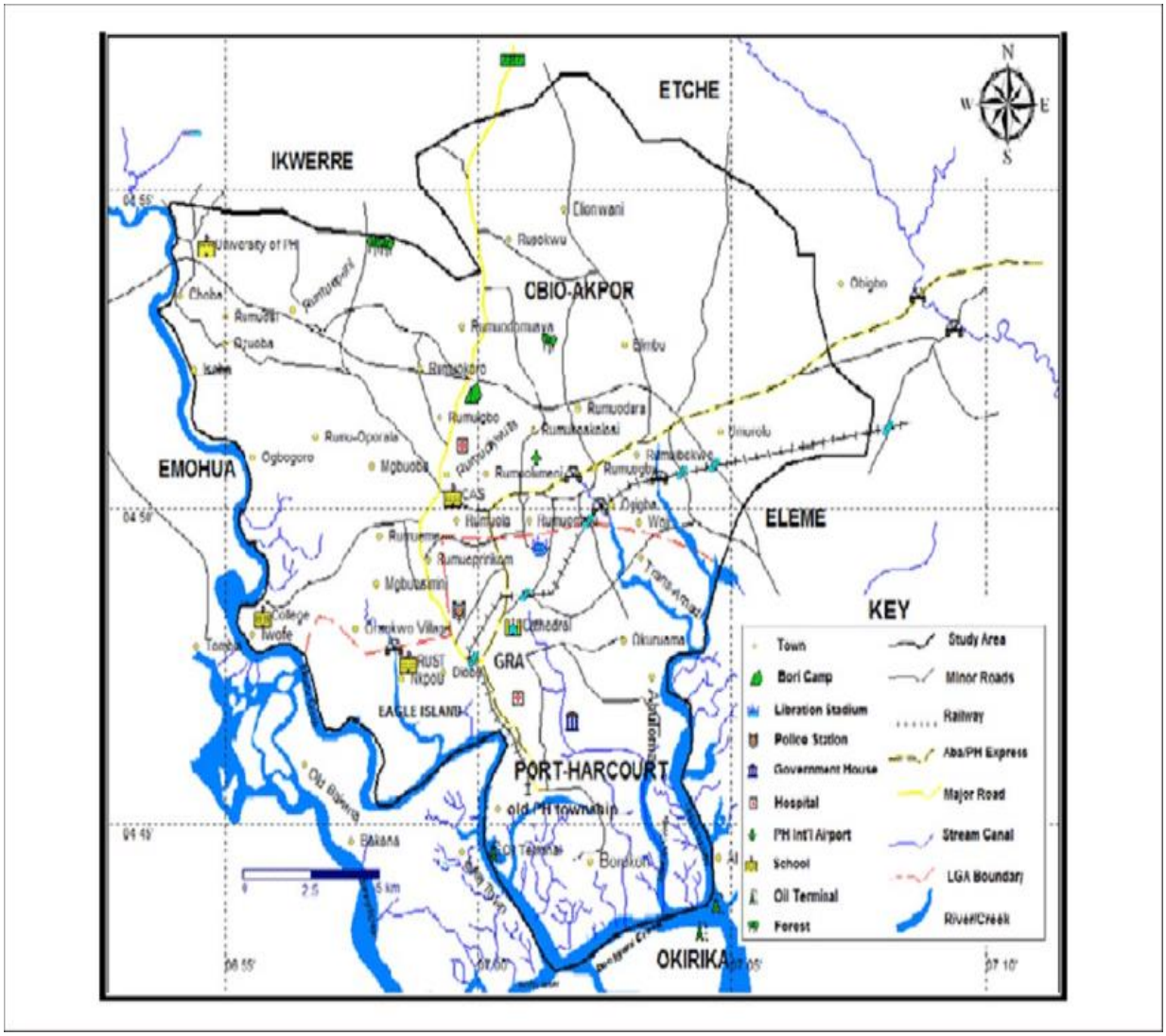

Figure 2: Map of Port Harcourt Metropolis

The study site is Port Harcourt city, Rivers State, Nigeria. Port Harcourt is a coastal city in the heart of the Niger Delta area of Nigeria. It is the capital of Rivers state which boasts Nigeria's biggest oil and gas reserves and is thus an important city because of its economic significance (Orazulike et.al., 2017).

Port Harcourt experiences perennial pluvial flooding with new areas being increasingly affected by devastating floods. Significantly, these new areas did not experience flooding in the past, but in recent years flooding has become an annual occurrence. The city has seen a significant rise in population and as a consequence, the number of urban dwellings (Kio-Lawson & Dekor, 2014). The increased flooding problem are seemingly linked to unplanned developments to cater to Port Harcourt's growing population. Port Harcourt thus presents as a fitting case study for flooding research.

3.3 Researcher Positionality

In qualitative studies, the researcher becomes a research instrument as they gather data and generate meanings from it. This entails understanding, describing, and interpreting perceptions and experiences to reveal and impart meaning in specific contexts and circumstances (Maguire & Delahunt, 2017). Qualitative researchers are thus at the centre of the research in every stage from the design stage to the final reporting stage. The centrality of the researcher to the research process can pose problems or ethical issues such as informed consent, confidentiality, and anonymity (Sanjari et.al., 2014). It is therefore important for a researcher to state her positionality in the research.

Positionality refers to the worldview or stance of the researcher in relation to the research. As noted earlier, a social constructivist worldview informed this research. Positionality is identified by locating the researcher in relation to the research participants, the research subject, context and the analysis process. A researcher's positionality thus affects every stage of the research process from the construction of the initial research problem to the analysis of

findings (Coghlan & Brydon-Miller, 2014). Declaring and understanding positionality involves reflecting critically on the limitations or advantages that derive from issues of status, gender, power and how this affects the research, and seeking ways to mitigate or address whatever bias this positionality might impose on the work (Reiter, 2017).

In this study, I am both an insider and outsider. I am an insider because I have lived in Port Harcourt and have had first-hand experience of the flooding. Insider's knowledge is a useful tool in qualitative research methods (Daly, 1992). Having lived in Port Harcourt has provided me with insider advantages, for example, I was able to use my networks within Port Harcourt to gain access to the respondents in this research. However, I chose instead to engage with planning experts and not with residents who have been affected by the floods. Engaging with Urban Planners positioned me as an outsider. While residents also have views on the flooding problem worthy of researching, the strategy of focusing on planning experts ensured that I was seeking the views of experts to help eliminate any bias that might have arisen as it enabled me to understand the flooding from the perspectives of urban planning professionals and to step back from my personal and emotional experience of the flooding.

3.4 Participant recruitment

A total of five interviews with urban planners were conducted. Purposive sampling is common in interpretative phenomenological studies because the desired sample is usually homogenous and requires researchers to specifically target suitable participants (Starks & Brown Trinidad, 2007). This approach was used for this research because only a specific group of people (urban planners) fit the research participant criteria for this study. Snowballing (also known as 'chain referral sampling') is a purposive sampling method utilized as an informal way of reaching the target study population (Cohen & Arieli, 2011). It is a respondent powered sampling method whereby respondents or participants with whom contact has already been made, use their contacts to refer the researcher to other potential

participants. The sample size grows like a snowball rolling as the number of participants in the study increases through referrals (Kirchherr & Charles, 2018). Purposive sampling is commonly used in studies using an interpretative phenomenological research approach because it enables the researcher to identify a 'closely defined group for whom the research question will be significant' (Smith 2015: 28). It is also particularly useful in explorative, descriptive studies and is commonly used to reach out to groups not easily reachable through other sampling methods (Abdul-Quader et al., 2008; Naderifar, Goli, & Ghaljaie, 2017).

Purposive sampling was used in this study because only a small and specific group of people were required for the study, which is typical of interpretative phenomenological studies (Starks & Brown Trinidad, 2007). For this research, I approached an acquaintance working as an urban planner with the Rivers State government and informed him about the research. He expressed interest in the research, and so I invited him to participate. The initial research participant referred me to a number of other participants. This reflects the snowballing recruitment method that involves word of mouth recruitment through reaching out to contacts within a respondent's social or other forms of network (Browne, 2005). For an overview of research participants, please refer to Appendix.

3.5 Data collection method: One-on-one semi-structured Interviews

The empirical foundation of this case study was one-on-one semi-structured interviews conducted over a period of two weeks, during which I spoke with five urban planners in Port Harcourt. The interview questions were constructed in a way that the respondents views on cause and effect relationships in the flooding could be determined. Personal data was not collected as it was not relevant to this study.

Interviews are a social research tool that aids in eliciting firsthand interpretations and explanations from people. One-on-one semi structured face-to-face interviews in English

were utilised because they reduced geographical and conceptual distance in the researcher-researched relationship and allowed the researcher to connect with participants at a human level (Råheim et al., 2016). Connecting at a human level was important to build rapport and minimize perceptions of the researcher as possessing superior knowledge. It also allowed the participants to speak their mind and feel more empowered as they can interact and respond better in a face-to-face setting in contrast to other remote interview methods (Oltmann, 2016). One-on-one semi-structured interviews are thus ideal for seeking opinions on a particular topic with key participants. Furthermore, the flexibility of the method generates useful rich data because it enables the interviewer to probe for detailed information and provide opportunities for participants to introduce an issue that the investigator had not considered (Hammarberg, Kirkman, & De Lacey 2016).

Semi-structured one-on-one interviews are mainly employed when a small number of participants are involved in the research (Pathak & Intratat, 2016). As urban planning professionals (planners, surveyors, architects, civil engineers) represent a small group in Port Harcourt, one-on-one semi structured interviews were utilised to generate rich narratives, and through these, gain a deeper understanding of how the urban planners in the study understood their role in the context of urban planning and sustainable development broadly, and to flooding specifically. These interviews were the primary form of data collection.

The one-on-one semi-structured interview format also provided a data collection approach that could fit in with the busy schedules of the urban planners. The format also avoided biases that may have arisen if participants felt constrained from expressing their views in a group setting. The interviews were conducted at different locations according to the preference of the participants. One was conducted in a restaurant, another at the participant's project site while the rest were conducted at the participants' workplaces.

Interview questions were open-ended and designed to elicit rich responses from participants on their understanding of the concept of sustainability, and how they incorporate this understanding into their work as urban planners. Interview questions were designed around topics of central concern to the research and focused on the following thematic areas: urban planning and controls; planners' understandings of sustainable development; the drivers of the flooding that occurs in the city; possible control measures; and the best ways to tackle the flooding problem.

In interpretative phenomenological studies, big samples are not necessary to yield rich data and the number of interviews conducted is not as important as the depth of the interviews (Starks & Brown Trinidad, 2007). Indeed, Travers (2014) notes that research has been conducted where one or two interviews were rich enough to inform the research, and that it is possible to glean valuable and interesting research findings by conducting just a few interviews. He argues that a key aspect of qualitative research is what the researcher is able to do with the interview data collected. The number of participants in a study is dependent on the purpose and goals of the study; in similar studies one to ten participants have been enough to satisfy the core needs of the study (Starks & Brown Trinidad, 2007).

The interviews were tape recorded with the permission of the participants. This proved very valuable and limited interruptions as the participants were speaking as might have been the case with handwriting where it may be needed to ask the participants to repeat what they have said to capture everything. Also writing down everything would have made it difficult to capture everything and miss important nuances.

3.6 Ethical Considerations

Informed consent, confidentiality, respect and anonymity were all ethical issues relevant to this research. Before field work commenced, ethics approval was received from Western Sydney University Human Research Ethics Committee (ethics approval number H13065).

The participants in the study all voluntarily agreed to be part of the research. They were informed of the goals and purpose of the study both verbally and in writing via the participant information sheet and how the study findings will be disseminated. Participants were informed of their right to withdraw at any stage of the project without penalty. Anonymity was ensured by the use of pseudonyms. The interview data was only handled by the researcher, the thesis supervisor and authorized persons from the transcription firm.

3.7 Analysing and interpreting data

There are different paradigms in qualitative research analysis including adopting a theoretical stance and establishing a comprehensive account (Sławecki, 2018). As highlighted earlier, this study adopted an interpretative phenomenological approach. Interpretative phenomenological studies aim to unravel meanings attached by people to phenomena with the goal of understanding the underlying issues or the research questions posed by a study (Alvermann & Mallozzi, 2010). The main aim of this study was to understand how the urban planning professionals in the study made sense of the relationship between urban planning, sustainability and flooding being experienced in Port Harcourt city. An interpretative phenomenological approach allowed for a detailed exploration of how participants make sense of their personal and social world and the meanings that particular experiences, events, and states hold for participants (Osborn & Smith, 2008; Smith & Osborn, 2015).

By using IPA, I was able to discern how urban planners in Port Harcourt understood sustainability and ascribed meaning to their work in the context of flooding. Rather than producing an account that has been proscribed by established theoretical preconceptions, IPA produced an account of the lived experiences of the research participants in their own terms, the desired outcome of this research. Findings were also evident from the data because the underlying experiences on which the findings were based were clear (Thomas, 2006).

3.7.1 Coding of interviews (coding process)

In qualitative studies, researchers need to make sense of the data in line with the purposes of the research. Thematic analysis, known as coding, is a way of analysing qualitative data. Coding is commonly used to analyse interview transcripts and is widely used in research in the social sciences. Researchers code data in order to find meaning in qualitative data (Alshenqeeti, 2014; Blair, 2015). It involves identifying themes or patterns in the data and interpreting meaning. This is achieved by engaging with the transcript interpretatively. As it is not always clear at first glance what understandings respondents hold of the research phenomena, a continuous engagement with the transcript or interview texts is necessary. The coding and analysis of the interview data in this study followed Bryman (2008)'s four step approach which involves (i) reading the texts (ii) rereading the texts (iii) coding the texts, and (iv) relating general theoretical ideas to the text.

Recorded interviews were transcribed verbatim into a word document. I read through the transcript a number of times, making annotations on significant or interesting responses. Reading through the transcript many times enabled me to become familiar with the various accounts of my respondents. New insights were gained during almost every rereading stage, and I was able to identify patterns of convergences and divergences among the different interview transcripts. Re-reading and annotating the transcripts enabled me to identify emerging themes which captured the essence of the responses as well as the connections between the themes. I then moved to analysing the themes and making sense of the connections between the emerging themes. While analysing the concepts, I was constantly checking my interpretations against my respondents' actual statements, to clearly distinguish both to avoid any confusion, as well as ensure the connections aligned with the actual responses of my research participants (Sutton & Austin, 2015).

3.7.2 Triangulation

Triangulation in qualitative research refers to the use of different data sources or methods to generate a thorough understanding of the phenomena being investigated (Carter et.al., 2014). Triangulation enhances the reliability and validity of findings through convergence of information from various sources. In social research, it is hard for researchers to demarcate themselves from their work and not bring their personal values, experiences, views and bias into their research. Triangulation also serves to deepen and broaden a researcher's understanding and facilitate interdisciplinary research. Triangulation was used to reduce bias (Fusch, Fusch, & Ness, 2018). Specifically, a comprehensive literature review, and reviews of newspaper publications on the flooding problem, planning laws and policies aimed to enhance the reliability and validity of interpretations.

3.8 Scope and limitations of Study

This research focused on the professional opinion of five urban planners practicing in Port Harcourt city to investigate urban planning, sustainability and flooding being experienced in Port Harcourt city in Rivers State, Nigeria. The smaller sample size limits the findings and their generalizability (Idowu, 2016). The research was also limited by funding and timeframe of the thesis component of a Master of Research degree. The following two chapters (Chapters Four and Five) present the findings of this study.

CHAPTER FOUR: Urban Planners conceptualisation of sustainability and the sustainable city

4.1 Introduction

This chapter provides an analysis of the interviews to construct an understanding of how the urban planner participants conceptualise sustainability and how they apply this understanding to their work in Port Harcourt. The chapter is presented across three sections. The first section unpacks the urban planners' conceptions of sustainability. The second section identifies how they understand the relationship between urban planning and the sustainable city. The third section explores the practice of urban planning in Port Harcourt by examining the intersection between the policies and laws designed to create a sustainable city and their implementation in the local parlance. Each lays the foundation for exploring how the urban planners conceptualise the link between planning and flooding in Port Harcourt, Nigeria which is explored in Chapter Five.

4.2 Sustainability: Planning beyond the present/now

As identified in Chapter Two, sustainability is essentially anchored on three pillars – (1) environmental protection or safekeeping, (2) social inclusion, and (3) economic advancement (Markulev & Long, 2013). Other features of the concept of sustainability are: intergenerational equity, consciousness (of the consequences of our actions today), openness and public participation (opportunity for the wider community to participate in decision making processes) (Emas, 2015; Kajikawa, Tacoa, & Yamaguchi, 2014; Lombardi, 1999). A common theme in the ways the sustainability concept has been defined is the responsibility placed on people to consider the impact of their actions beyond the fulfillment of their immediate needs, and to think in terms of longevity. In urban planning, most of the definitions of sustainable development place emphasis on planning and thinking beyond the needs of the current generation (Wheeler & Beatley, 2014). Sustainable development

emphasises the importance and need to change the predominant ways of doing things to fulfil current needs without depriving the future generation of the resources they need to thrive on earth (Koroneos & Rokos, 2012)

The emergence of sustainability as the new planning paradigm has seen a concern for the future become a core component of planning (Al-Hadad, 2013). Wheeler (1996) provides a conceptual framework within which to locate the urban planners' understandings of sustainable development. Wheeler (1996) argues that despite the different ideologies and stances on sustainability, there is a general agreement and focus on sustainable development as planning for the long-term. Urban Planners therefore have a responsibility to ensure that their actions lead to long-term enhancement of ecological and social wellbeing.

The following section outlines the understandings and interpretations of the urban planners' conceptions of sustainable development.

4.2.1 Improvement, longevity and maintenance for the long-term.

Planning with consideration for the future is widely talked about in the literature on sustainability in planning (Naess, 2001; Yigitcanlar & Kamruzzaman, 2015). One of the main tenets of sustainable development is social well-being (Cuthill, 2010). This understanding is reflected by Paul, who understands sustainability as a focus on long-term improvement in social wellbeing:

> Sustainable development is you know, programs or projects just geared towards improving the lives of the people, empowering the people and improving the standard of living of the people, because everything we do, we don't do projects just for short-term. We do everything for long-term everything you do, you do for the future, for the long-term, so we develop anything for the long-term basically.

Paul's view puts the social wellbeing of humans at the centre of sustainable development and reflects one of the three pillars of sustainability — social inclusion and economic advancement. Priye's understanding of sustainable development is also linked to human well-being. He states that:

> The concept of sustainable development from the planners' point of view is as old as man. Live, eat and remain for the future generation to also eat at the same level you have enjoyed it. It's a continuity, a natural process.

Significantly, Priye believes that sustainability is not a new concept. His view links the idea to traditional land management practices. He points out that the concept of sustainable development entered the mainstream after the environmental activism of the 1970s when the term 'sustainable development' was coined to capture the new environmental consciousness of the time:

> Sustainability is the global jingle everybody is talking about. You know when this term came from the conference of the 1970s, the global conference that made this now to turn to a global word that everybody is looking at. It [sustainability] is natural. Our forefathers practiced it. I could remember my Uncle was a hunter, there are some certain animals that will be trapped in one of his traps. If it is not up to a certain age, he will release it and that is how the environmental law came into existence. He is releasing it not because he cannot eat it, there are norms, values they have tied to deities. While we have some sanctuaries that don't allow people to farm this because they want to create an abode where animals can go for refuge, procreate there and the animals will come back. All these things are something that if you look down all those interpretation, they tie it to deities but it is not. So all the plans as far as greater Port Harcourt master plan is concerned and all that the planners are doing are subject to sustainability because any thing that is not sustainable will not last a city is not…a city is built for the present generation, future generation even the past generation.

Priye's view that sustainability was practiced by his forefathers is also encapsulated in the beliefs of social activists and radical ecologists. This view is in line with Wheeler (1996), who notes that traditional societies are the tested models of sustainability. He argues that indigenous societies lived with a reverence and respect for nature and land that seem to be lacking in today's industrialized world. Priye's depiction and illustration using animals is captured in Wheeler's (1996) theme of 'Maintenance of the natural capital'. The act of releasing animals who are not mature enough, as noted by Priye, and creating sanctuaries where they can procreate is a way of ensuring that the animal stock is maintained for the future generation. Priye's response also shows that planning is not just for the present generation but also for the future generation fits with Wheeler's (1996) theme of 'planning as consideration for the future in our planning activities of today'. We observe the common

theme of meeting the needs of future generations in both Priye and Paul's understanding of sustainable development. There is an agreement from the interviews on the importance of factoring in the cost of our actions today on the future generation.

Ovunda's view emphasises the interrelationship between sustainability and longevity. He comments:

> Sustainable development in my own understanding are those activities relating to development that will stand the test of time.

Ovunda emphasises longevity as a key aspect of sustainability. This is significant because planning has long been concerned with building communities that will stand the test of time and enable people to reach their full potential and aspirations in the community (Gallent, Tewdwr-Jones, & Wood, 2008). However, a number of scholars have established that flooded communities are antithetical to the tenets of sustainability (Dasgupta, 2007; Dube et al., 2018a; Hammond et al., 2015; Minamiguchi, 2008).

4.2.2. Urban Planning — "it's all about sustainability"

Another theme that emerged from the research data was the notion that a primary goal of urban planning is to achieve sustainability. This is an important finding as sustainability is the anchor on which contemporary urban planning takes off globally (Adhya, Plowright, & Stevens, 2010; Lombardi, 1999). Landmark documents on sustainable development like the Brundtland (1987) report and the Rio Declaration (1992) specifically highlight urban planning as central to, and very important in, achieving sustainable development.

The urban planners in the study viewed planning as a means to achieve sustainable development and understood that achieving sustainability is the central purpose of planning. This view is articulated by Tamuno who commented:

> Sustainability is the core of urban planning today because cities are in competition, and if your city does not meet up the 21st century requirements then other cities will overtake you, so it [sustainability] is important because smaller settlements are also growing to larger cities and it is the population investment and so many other factors that makes a city what it is, if not it will decay.

Tamuno focuses on sustainability as the core of urban planning. His view articulates with the current mainstream understanding of sustainability as the new planning paradigm, reflected in the professional training required to be an urban planner (Carmon, 2013) and may be reflective of his background as an academic and government planning consultant who is abreast of contemporary viewpoints on sustainability in planning circles. Other urban planners in this study shared Tamuno's view, including Ovunda who stated:

> Urban planning, as the name implies, is planning to achieve something good. And sustainable development planning is all about making provision for sustainable development.

Paul also shared the view that planning is central to sustainability and highlighted the relationship between poor planning, lack of development and flooding. He commented:

> I think they [sustainability and planning] are interwoven. I think urban planning is also about sustainable development, you know, because part of the failures, part of what we are experiencing is just like failure, lack of proper planning on the side of the urban development [authority], that has also caused setbacks. So, I think it is interwoven, they work together. If the urban planning authorities do proper planning, there is you know, development, there is sustainability you know, and development in the area so you won't have like the flooding for instance. People are made to leave their homes. It is as a result of no planning on the part of urban development. So, if urban development authorities are doing their work you know, as they should, there would be sustainability in terms of project development and all of that.

Paul discusses the economic and social burden of flooding on people. This is significant because the cost of poor planning in Port Harcourt is particularly high as residents have suffered economic losses and deaths (BBC, 2018; TVCN, 2017). Those impacted by flooding are entrenched in a cycle of poverty as the flooding has become an annual occurrence that destroys whatever they have managed to gather for the year. They remain stuck in the same flood-prone neighborhoods because they mostly do not have the means to seek better lodgings (Chiadikobi et al., 2011; Oriji, 2015; Otomofa et al., 2015).

Priye highlights the relationship between sustainability and adaptability in urban planning. He commented:

> Sustainability is relevant because in urban planning, it is the new paradigm in planning. In fact, … we have even shifted from sustainability to adaptability. Yes you sustain it, but there must be

> adaptability, because there are certain things natural consequences that you cannot control so that is the next level the planners are looking at.

In urban planning, adaptability is used interchangeably with resilience and refers to ways of addressing climate change induced threats like flooding in urban areas especially in developing countries (Tyler & Moench, 2012; Wong-Parodi, Fischhoff, & Strauss, 2015). Adaptability or resilience is the ability of a city to absorb shock during unforeseen events and is a factor considered in sustainable urban planning.

Sustainability forms the core of planning today and the urban planners in this study clearly articulated the interrelationship between the two and the centrality of planning to achieving sustainable development. The planners expressed the view that planning for sustainable development must be forward looking. Significantly, the views on sustainability and sustainable development by the planners articulate with research and contemporary understandings of sustainable development (Al-Hadad, 2013; Säynäjoki, Heinonen, & Junnila, 2014; Yigitcanlar & Kamruzzaman, 2015).

4.2.3. Urban planning laws and Sustainability

Sustainability is integral to the new planning agenda and has become a key feature in global contemporary planning laws, policies and master plans (Bogdana, 2011). In Nigeria, laws and policies guide the work of government establishments. The Nigerian Urban and Regional Planning Act (Decree 88 1992) is the planning code in use in Nigeria. Rivers State has the Rivers State Physical Planning act of 2003 and the Greater Port-Harcourt City Development Authority Law No. 2 of 2009 in place, which guide urban planning at the state level. The state laws work within the framework of the National Planning Law. This section unpacks urban planner's views of the existing laws and policies to identify whether they view the laws as incorporating or fostering sustainability.

Priye commented on the feature of sustainability in existing laws:

> Yes it [sustainability] features therein [in the laws and policies] in the sense that even in the planning laws, there is restriction of giving permit to a wet land and that is why even in planning itself we have areas that we reserve for recreation. Recreation is that we understand the sensitivity of the area and marry it with a land use that can retain that natural setting and also provide employment, provide comfort, while providing also recreation.

Paul commented:

> If the laws are followed you know, one thing is to have the laws, so if the laws are followed and there is implementation you know, yea there will be no need to correct or change you know, because they are good.

Priye and Paul's responses support Adeloye and Rustum's (2011) view that the planning problem in Nigeria is not due to a deficiency of good laws and policies, however Priye emphasised the need of planning policy to keep up with social change:

> Planning is dynamic… why the city is moving is that the law is not static. The law is to serve humans as technology changes, so behaviours are influenced, attitudes are influenced, lifestyle has changed, so the laws need to grow, to address those needs because society is meant to move forward and not backward, but in this clime it is not done that way. The master plan that you are talking about is overdue for review and if you review the master plan the law too should be tinkered to accommodate those reviews.

Priye highlights the problem of non-review of the original master plan of Port Harcourt to reflect the changing urban scape. A master plan is a blueprint to the future of a city or landscape. It guides the general character of a community, growth, physical form and development pattern of a place (Nallathiga, 2015) and provides guidance to the authorities on growth-related issues. A good master plan shapes the sustainable development of a community. Plans are forward thinking and naturally a city's master plan factors in projected growth patterns. The master plan thus guides the development of a sustainable city.

It is important to note that the Port Harcourt master plan has largely been neglected in the development of the city. It is therefore not surprising that the required periodic review of the plan has been overlooked. Priye advocates for ongoing review and revision of masterplans as required by law. Non-revision and implementation of master plans is an issue in Nigeria at large and not just Port Harcourt (Adeponle, 2013; Lamond et al., 2015).

Like Priye, Tamuno also thought that planning laws featured sustainability, however he felt that a key barrier to the sustainable planning was a broader lack of understanding of the concept, which led to resistance to the implementation of sustainable planning practice. He said:

> They [the laws] tend to feature sustainability… but it goes again the people don't understand so they resist it. They don't understand that certain things are good for them because they were not part of the process of the preparation of the law, so they resist it even when it is good for them. You know, in some forms I will say no and in some I will say yes because …. what is a plan? A plan is supposed to be a synthesis of the needs and aspirations of the people, if the people are not carried along and if they don't understand the plan, the plan cannot be sustained because people will fight against it, but the plan, if every person knows about it, every person understands it, people want to key into it, then it will be more sustainable, but the way currently we draw our plans … it doesn't carry the people for whom the plans are really prepared for all along…..our plan has not taken deep root based on that.

Tamuno's comment highlights the importance of a shared understanding of 'sustainability' and points to the importance of participation of people in the planning process. Tamuno's view could be due to his work as a planning consultant where he has worked in different capacities with the community and government.[2] Through his engagement with diverse stakeholders in the planning process he is able to understand diverse perspectives including those of community members and the reasons for their non-cooperation with the government's plan.

The diversity in the views of the planners on the adequacy and feature of sustainability in current laws sustainability could be attributed to their different working fields and experiences. Those planners working in construction roles in the field (for example Paul) have a firsthand experience of the lack of monitoring and follow-up by the authorities after approval of development plans, as well as the lack of physical mapping of layouts, which has led to poor developments. The law provides for inspections and supervisions by the planning

[2] Around the time of the interviews, there was a building collapse in Port Harcourt which led to deaths. Tamuno was a member of the committee set up to investigate the incident.

authorities. The non-adherence to the provisions of the planning laws has caused this group of planners to identify gaps in monitoring.

The differences in participants' views could be interpreted in the light of their professional practice. The planners in policy implementation roles saw gaps in current policies, mainly in the area of community participation, but they also called for the extension of the powers of the planning authorities to make them more independent in order to minimize the impact of government bureaucracy and poor funding when carrying out their duties. By contrast, respondents working in construction roles saw the laws as good enough and mainly identified gaps in policy implementation and monitoring.

4.3 Aspirations: a sustainable city

This section explores planners' understandings of a 'sustainable city'. Discussions of sustainability in planning are incomplete without mention of the sustainable city as they are interwoven because developing a sustainable city means urban sustainability has been achieved. The sustainable city concept emerged in response to the challenges faced by urban areas to help cities cope with challenges like rapid urbanization, population growth and poverty. These challenges increased over the years as a result of the population increase in urban areas.

The sustainable city is largely the goal of sustainability in planning and is a core aspect of sustainable urban planning. It is a city designed with attention to the economic, social and environmental impacts of development (World Bank, 2018). Ideally, a sustainable city is devoid of any environmental issue that could negatively impact its development like the flooding being experienced in Port Harcourt. Given the cognizance of the need for sustainable human settlements in contemporary times, the new Greater Port Harcourt City Development Authority (GPHCDA) was established in 2009 to oversee the development of a

new sustainable city and reverse the current decline in the condition of Port Harcourt urban scape (Dan-Jumbo, 2018).

In this study the planners' insights on what makes the sustainable city were explored. Priye spoke in detail about his understanding of a sustainable city:

> What comes to mind when we talk about 'sustainable city' is simple—it's a city that can feed itself; it's a city that can create employment; it's a city that can withstand natural disasters, because in the design they have keyed in adaptability; it's a city that can grow after a shock; it's a city that allows equity [for] both men and woman; it's a city that gives room for disability; it's a city that reduces over-reliance on automobiles because of their effect in terms of pollution [like] carbon monoxide. It's a city that encourages walking, hiking; it's a city that encourages densification in planning where they try to minimize the land use altogether, so that travelling time will be reduced to save costs…

Priye's understanding of the sustainable city is reflected in Wheeler's (1996) themes of satisfying human and ecological needs (feeding itself, reducing pollution, minimizing land use), improvement and maintenance of systems (equity, giving room for disability), protection and restoration of the ecosystem (growing after a shock, withstanding natural disasters, adaptability), sustenance of human livelihood (creating employment).

Tamuno's view emphasises themes of sustenance of human livelihood (doing business), satisfying human and ecological needs (movement, recreation) and protection and restoration of the ecosystem (environmental quality).

> Sustainable cities are cities with little encumbrance in terms of doing business, in terms of movement, circulation, in terms of environmental quality, in terms of recreation and business.

Paul in contrast to Tamuno and Priye centred his response on longevity and consideration for the future saying:

> Sustainable cities… for the long-term, your planning is not just for today. Your programs, your development, your construction work is not just for today, you build with the future in view, to be able to curb challenges that will arise, there is growth, people are developing, there is development as the people are moving from the rural areas to the urban areas you know, that is urbanization, so you build with the view of these for the future, the challenges that this will give birth to.

Paul's view of sustainable cities emphasises planning for the long-term and envisaging challenges that may arise in the future. This view reflects the understanding of urban

planning promoted and encouraged in today's planning parlance (Yigitcanlar & Kamruzzaman, 2015). Paul highlights rural to urban migration as a challenge that urban planners need to consider when designing sustainable cities. Like Paul, Ovunda also recognized that urban growth is an important consideration when planning sustainable cities:

> When you talk about a sustainable city you are talking cities that are well planned that will sustain, that the development will meet up with the urban growth.

Ovunda and Paul's understandings of the sustainable city as one that can keep up with urban growth is in line with other expert opinions in light of the projected global growth of cities (Riffat, Powell, & Aydin, 2016). Urbanization has been identified as the biggest threat to achieving SDG 11 (sustainable cities and communities) (Bettencourt et.al., 2007; Hove, Ngwerume, & Muchemwa, 2013; Koch & Krellenberg, 2018) Today, more than half of the world's population live in cities and this number is rising as cities are expanding rapidly (Dobbs et al., 2011). It is projected that 70% of the global population (currently 6.5 billion people) will live in urban areas by 2050. Of this 70% projected growth, 37% will occur in only three countries: Nigeria, China and India (UNDESA, 2015). The biggest urban growth is occurring in developing countries like Nigeria, which is experiencing rapid migration from the rural to urban areas. Port Harcourt as one of Nigeria's major cities will no doubt contribute significantly to this trend based on its current growth rate of about 3% per annum (Aliyu & Amadu, 2017). Building sustainable cities and improving urban planning is thus key to cushioning some negative effects of urbanization (UN, 2014). This view was also reflected by Barry, whose view of a sustainable city emphasises that a master plan ought to be followed. This contrasts with the local situation where the master plan has not been followed. Barry surmised:

> The sustainable city is a city where the master plan of the city is followed.

In Nigeria several factors mitigate against adherence to master plans, for instance, political interference. Conversion of land zoning to enable uses contrary to original purposes is common (Awuah, 2018; Bakare, 2012). The non-adherence to master plans has meant that the development of many Nigerian cities like Port Harcourt have occurred without provision of key infrastructure that form the backbone of cities. This has contributed significantly to the flooding being experienced as standard drainage infrastructure which forms the backbone of cities is non-existent (Adeloye & Rustum, 2011; Akukwe Thecla, 2014; Elenwo & Efe, 2014).

The above discussion reveals the planners' understandings of 'a sustainable city' centred around phrases like "well planned", "inclusive", and "meeting up with urban growth". The planners talked about the sustainable city longingly, and their understanding was deemed as aspirational. The planners' desire for a sustainable city is significant as Port Harcourt city currently embodies everything that a sustainable city is not.

4.4 From rhetoric to practice

This section explores the ways planners incorporate the principles of sustainability in carrying out their work. This is important because putting into practice knowledge about sustainability is central to achieving a sustainable city. The way the urban planners in this study applied sustainability principles was shaped by their different roles, with actions geared towards sustainability differing between those working in offices and those working in the field. For example, office workers look out more for certain features in master plans or building plans and do not approve plans if these features are absent, while those working in the field implement the approved plans.

Priye describes the focus of the planning process for office workers:

> It [sustainability] is the hallmark of planning. Let's start from the rudimentary aspect of it. You know planning is policy making that is what planning is all about. Planning holistically based on

> the present school of thought is based on sustainability, from the preparation of site plan to zoning plan from the zoning plan to sub-division from subdivision down to the master plan.

Ovunda outlines in detail the planning rules that must be taken into account in the planning approval process:

> We incorporate sustainability by following laid down principles. Every profession has its own laid down procedures, 'the do's and don'ts'. For example, if you want to consider an approval for development you will consider the laid down rules. There are things we call setbacks. For every development we are considering, for example, if you are talking about development along a class B road we have laid rules for it, if you are talking about class A road we have the rules just like that, if you want to carry out a development along a canal, a storm water canal, there is laid down rules, this development should be a certain meters away from this existing infrastructure, to ensure that this development is sustainable. You don't, if the rules state you should… you have to follow, offset I mean set back 10 meters, it mustn't be less than 10 meters. It has to be10 meters at least so that all these laws we are not following because they just want to make laws because for example a canal from time to time routinely should be cleaned maybe once in a year. If they are being cleaned of those debris, they will have to drop somewhere before they are taken off so all these setbacks will serve as areas that will serve this purpose. If in future, talking about sustainability there is a facility which was not provided for in the master plan and there's need for it, you don't need to go to begin to demolish the existing development … you consider these setbacks and look, do your studies to know if those facilities will be compatible within the setbacks, those areas reserved for those facilities. If you also want to expand maybe underground pipe-borne water and you have…you want to increase the size of …a volume of water that is being circulated everyday definitely the size of the pipe will increase and those things.

Successful urban planning is primarily a function of competent urban planning administration which entails control (Daramola et.al., 2017). The interviews with the planners established that the relationship between planning and flooding was caused by a failure of the planning authorities (in whom planning power had been vested) to take control of city development and expansion. Ovunda said:

> The relationship between the flooding and urban planning is that the flooding that we are experiencing in Port Harcourt is as a result of failure on the hands of the Ministry of Urban Development to take total control of planning in the old Rivers state. It is as a result of their failure, their inefficiency that made the state government to establish the Greater Port Harcourt City Development Authority such that a new city will be created.

Control has many aspects including supervision, implementation of regulation, layouts, and infrastructure planning. Weaknesses in development control has led to violations of the rules and regulations in approved plans that ought to guide construction (Awuah, 2018), as evident

in Port Harcourt's flooding issue. The disjuncture between planning and practice has led to development following an erratic pattern and construction on floodplains and drain channels, as well as a lack of infrastructure, like drainage systems in developing areas. During our interview, Paul illustrated the disjunction between planning and practice. He explained:

> You see where we stand here now, you see this building, they have already removed it before, you see the building line, setback, it is already defined but… maybe because the authorities are not checking, this man has added another one again and before you know it, by the time they roof it, the shop owners want to do an overhang, they will come further into the road, and sometimes if it is a drinking spot, a bar or something before you know it, they will come into the road and then sometimes, they will put activities, or fill up or close the drainage.

It is not uncommon to in Port Harcourt to see where owners go beyond approved designs and continue construction even after being asked to stop by the authorities. In some cases, the government workers who come to the field to carry out inspections only do so because they are seeking bribes from the people who are building as a result of endemic corruption in the system (Ijewereme, 2015). Paul identified two main reasons for the disjuncture between planning rules and practice: (1) the absence of inspections before approvals to ensure that construction will not be carried out on floodplains, and (2) the lack of monitoring of construction after approval to ensure that the approved plan is followed. He stated:

> … where my house is in Rumuodumaya, we had serious flooding in 2006, and we also had in 2007. The Ministry of Urban Development is supposed to move into… for instance, where I am building here now, there is no presence [of the ministry], even though we have done the approval, and they have given you approval. But they don't come to inspect; they have failed, they don't go into these developing areas, these new [areas] you know, to do layouts and do waterlines or do drainage system. They have these things existing and ensure that you are following the regulations. You know, you pay them, they give you the approval but they don't come out to inspect and ensure or even outline or map out the areas; your drainage system is not supposed to be done by one individual, it is supposed to be by the state, by the Urban Development Authority. So, because they are guided but they don't do any of that; they just stay in the office so they allow people to build as they like, so yea, that is part of the what is causing the problem.

Paul's comment below describes the pressure he experiences from clients to disregard planning policies and laws and highlights the implications of the lack of monitoring of constructions for those planners working in the field.

> When I develop, unfortunately, some clients sometimes, due to funds,….money constraints, some clients want you to lower standards, you know, cut costs, you know, but of course, as a professional you ought to do the right thing …if you have setbacks for instance, a client that has a plot of land, most times will want you to cover everywhere, sometimes, they want you to go

> outside their, the plot, they want you to build over the plot…some build over the drainage systems and all of that. Most times you want to, as a professional you want to maintain standard. Like your DPC for instance, if you are building you have to take the DPC[3] to a certain level. Some due to costs will say no, you know, I can't afford this but as a professional you want to as much as possible insist on maintaining standards.

Paul's dilemma of managing the tension between maintaining standards and satisfying clients is heightened as he depends on clients for jobs. Satisfying clients is necessary for him to get repeat jobs and referrals which is important in his line of work.

The planners working in the offices identify failure as stemming from the government's non-provision of funding needed to carry out the work, political interferences (where the Governors themselves sometimes interfere in land allocation processes), and non-alliance with the locals who do not trust the government especially in land matters (Bakare, 2012).

Ovunda, who works with the GPHCDA, expressed a desire for the agency to have more resources to manage sustainable urban planning. He stated:

> Yes, there are some parts of the law that limits the authority [GPHCDA] to just monitoring, supervision monitoring and control. I mean you should go beyond that so that the authority, the Greater Port Harcourt city should also be empowered to be like a revenue generating authority such that the issue of sustainability will also … that will complement the issue of sustainability because it should not rely solely on government for (running) the day to day activities.

The desire expressed by Ovunda for the self-sufficiency of agencies could be linked to the corruption endemic in the Nigerian system which manifests in underfunding of ministries and hence their poor performance (Awofeso & Odeyemi, 2014). Poor funding of government agencies and ministries impacts the execution of duties including the monitoring of construction after a plan has been approved.

Ovunda's call for an extension of powers to the new planning agency (GPHCDA) to generate revenue reflects a desire to be self-sufficient in order to rely less on government funding in carrying out the agency's day to day tasks. The corruption has also ensured the continuation

[3] DPC means Damp Proof Course and is a barrier constructed below the main housing walls to prevent or control moisture. It can be done with different construction materials but usually with cement concrete in Nigeria.

of building constructions that contravene the planning laws and policies, as well as conversion of land already earmarked for a purpose in the master plan to a different use (Bakare, 2012), which impacts sustainability. The Nigerian government has thus not created an enabling environment for the master plans to be implemented. Corruption is ingrained in the Nigerian system (Roy, 2017), and this has led to massive looting and diversion of funds that should have gone into infrastructural provision, and/or the funding of the planning authorities to carry out their work further. It is not uncommon for the people to pay out of pocket for services that should be ordinarily funded by the government, nor for people in power to undermine the law in land allocations or sell off government properties to their friends, who convert it to uses not provided for in the master plan (Ayotamuno, Gobo, & Owei, 2010)

4.4.1 The dearth of community engagement

The planning law which is the guidebook for planning makes clear provisions for community participation in drawing up plans. However, this is not the case in practice or real life in Port Harcourt and it has led to many setbacks and problems in the implementation of planning laws and policies. Tamuno highlights the lack of community participation in the planning process:

> You cannot …and that is part of what is causing the fight in greater Port Harcourt, the greater Port Harcourt master plan. Communities don't understand it [the plan], even some of the people that are supposed to implement it don't even understand the thing. For example, people had sold their land and different things and you are coming to say no you cannot. What you will look at every person, bring people together and say ok you have bought this land for XY purpose but we have done a plan with you in agreement to say ok no we are keeping this, so why don't you swap so that the person who wants to build for example, residential where we have zoned commercial, will go to where the residential is and swap with somebody who wants to do commercial so that it doesn't take so much from the government. If the people know they can trust the government they will allow such exchanges, but for now we have not been doing that, we still have that yardstick that the government use in cheating the people.

A major problem in Port Harcourt is the opposition to the new greater Port Harcourt city plan by the people who were not part of the drafting process (Amnesty, 2010), but who see the

final plan as an imposition and a form of oppression by the government keen to take their lands from them. This has led to lack of support for the Greater Port Harcourt city master plan by the city's inhabitants. Resistance by community stakeholders is clearly an obstacle to achieving success in planning for a sustainable city as community engagement is necessary to achieve success in modern day planning and sustainable development.

The benefits of community participation in planning cannot be overemphasized, which is why Nigeria's planning law makes provision for this key aspect of planning. When the people are consulted and master plans encapsulate their ambitions, views and desires, success is almost guaranteed and discrimination or prejudice controlled (Bakare, 2012; Salim & Ivan, 2016). In contrast to the experience of Port Harcourt, there have been cases of planning success achieved in Nigeria, for example in the Emene community of Enugu state, Ibadan and Kano state, Nigeria, where the community actively participated in the planning process, which contributed to its success (Awuah, 2018).

4.5 Conclusions

This chapter has discussed how the five urban planners understand sustainability in relation to urban planning and to their role as urban planners. Despite the different meanings and definitions the planners had of sustainable development, they demonstrate a strong understanding of what sustainability means and its place in urban planning. This chapter has identified that the urban planners understanding of the concept of sustainability focused on longevity, building long lasting human settlements and consideration of the future in today's planning decisions. This aligns with current global thinking of sustainability in planning with good planning seen as central to sustainable development. The sustainable city is a core aspect of sustainable urban planning. It is a city designed with the future implications of decisions considered and foreseeable challenges factored in and addressed in the light of population increase and urban growth with a reference point being the key tenets of

sustainable development. The lack of community involvement in planning in Port Harcourt was identified by urban planners as a factor mitigating against successful planning. With regards to the planning law, there was a consensus among the urban planners that they were good enough and incorporate sustainability principles, but setbacks lie in non-implementation of the laid down laws. Some planners also called for a review of certain aspects of the law in order to better achieve sustainability.

The next chapter discusses the how the urban planners perceived the link between planning and the flooding being experienced in Port Harcourt, as well as views on stemming the tide.

CHAPTER FIVE: PLANNING AND FLOODING

5.1 Introduction

Two aims of this research were to establish how planning influences the flooding being experienced in Port Harcourt, and to seek expert opinion on how to control the flooding. Chapter Four of this thesis explored urban planners' understandings of sustainability, sustainable cities, the place of sustainability in planning and how it is applied in their work. This chapter explores the urban planners' understandings of how urban planning in Port Harcourt contributes to the city's flooding problem, the impacts of flooding on the population, and their solutions to the flooding plague. This relationship is detailed in three sections: (1) Implications of poor urban planning in Port Harcourt; (2) waste management in Port Harcourt; and (3)Addressing the flooding in Port Harcourt: urban planners' perspectives.

5.2 Implications of poor urban planning in Port Harcourt

As identified in Chapters Two and Four, a housing construction boom in Nigeria has fueled increasing urbanization and population growth of major cities such as Port Harcourt. Agricultural lands are also being increasingly converted to residential areas to accommodate housing needs and development is carried out without proper controls and infrastructure in place, thus worsening the flooding problem (Dan-Jumbo, Metzger, & Clark, 2018). Urban planning in Nigeria is poor and this is compounded by numerous compliance problems; this poor planning is a primary cause of the flooding being experienced in Port Harcourt during the rainy seasons. The participants in this research shared their understanding of the effects of poor urban planning on the city. Priye commented:

> There is high correlation [between planning and flooding] because most of the areas that are experiencing this deep-seated flooding are not planned. If we look at it [the flooding problem] from the holistic approach, it is urbanization. Our land use management is also a problem where people are building on floodplains. The flooding of 2012 and the one that happened recently we were able to trace points that they have blocked this natural drain.

Ovunda also noted this trend of constructing on waterways saying:

> Carrying out indiscriminate erection of building, some of these buildings are built on the natural waterways, on the natural canals and not regulating or maintaining the open spaces.

As both Priye and Ovunda observe, lax enforcement of planning laws have seen construction projects in Port Harcourt build on natural floodplains and in storm water paths. This obstructs the free flow of water which leads to flooding. Such building constructions also increase stormwater problems by leaving no escape path for flood water, and compromises the integrity of these buildings which can lead to more problems like building collapse, which is not uncommon in Nigeria (Olukanni, Adebayo, & Tenebe, 2014). Flood waters also weaken building structures (Chendo & Obi, 2015; Dube, Mtapuri, & Matunhu, 2018b) which promotes the collapse of buildings. Recently, on 13 March 2019, a building collapsed in Lagos, Nigeria's biggest city, killing 20 school children (Adebayo, 2019). In Port Harcourt, another building collapsed in November 2018 killing seven people (Iheamnachor, 2018b). Flood waters standing for long periods on asphalted roads also destroy the asphalt cover, impacting on the already weak infrastructure of Nigerian cities (Aliyu & Amadu, 2017).

The construction of buildings on floodplains and on areas that block storm water paths raises important questions regarding what procedures, if any, were followed in granting planning approvals for these development projects. It also raises questions regarding whether such building approvals were influenced by bribery, which has become a widely accepted practice in Nigeria (Hope, 2017; UNODC, 2017). Adeloye and Rustum (2011) argue that lax planning and the lack of valid building approvals is the root cause of irresponsible developments with attendant consequences.

In developing societies, the poor end up being the main victims of such corrupt practices (Yamin, 2014). For instance, when the consequences of building on the wrong plains manifests in the form of flooding, the poor have no recovery buffer or safety net, unlike those who are better off financially.

The research participants lamented the disregard for development plans by developers and building constructions on places that block waterways. Barry noted:

> People are neglecting the principles of development, of sustainability by building on the waterways where they are not supposed to. There is a channel for water to move and it is the people that own the community, because of money or whatever, who sold the place to individuals and they [developers] develop and block the waterways. And when there is rainfall there is no way water will leave the place, it will turn to flood and we are suffering. A case study is Port Harcourt here, in many places. So the people are not following the development [plan] of the city.

Barry's view that the government needs to ensure that development plans are adhered to in order to address the issue of flooding in Port Harcourt could be rooted in his first-hand experiences of non-adherence to a master plan by virtue of his job as a council planner. It is clear to him that the constructions springing up every day do not align with the master plan. Barry attaches great importance to compliance of the master plan as can be seen from his earlier statements. He strongly believes that the master plan is the holy grail of urban planning and following it will lead to sustainability.

Paul also notes the disregard of development plans by developers:

> You also have the people who are developing, the developers like I cited, I said sometimes you have clients who build beyond, who don't follow the building, respect the codes you know, who don't follow, like you have a plot, you have drainage system, you want to build beyond, you have setbacks that you are supposed to follow, you have right of ways, you know, people build and go beyond their plot. They cover the right of way you know, they cover the drainage system so and of course if you build over and across the drainage system, you are blocking the natural waterway.

Paul infers that people willingly and consciously commit such infractions. One possible reasons for this is they know that the planning laws are not being enforced. If there were real consequences, like fines and punishments for the actions of the defaulters, the situation might be different as people are more inclined to change their attitudes faster when there is a price to be paid (Bar-Ilan & Sacerdote, 2004) . Tidy (2011) supports this view, arguing that people are more likely to change their behaviour either when punishment is seen as a real threat, or when people have been punished or know someone who has been punished themselves.

The impact of flooding is inimical to sustainability and negatively impacts achievement of the SDGs. This is because it affects all three bottom lines (social, economic and environmental) of sustainability (Onifade et. al., 2014; Reckien et al., 2017).

Flooding takes a huge psychological, physical and economic toll on the people and impacts the environment. Tamuno describes the financial, psychological and economic impact of flooding:

> Well, the residents living within an environment, and you know whatever you buy, you think that "ok, the next twenty years I will not be buying a mattress again", but the flood can make you now to start looking for money. Your certificates are compromised, your household things, your life because we have had situations where electrocution had taken place from the flood. So, it has a huge financial, psychological, mental burden on the people affected by the flood. In terms of environment...if it is where you have cropping, it also could destroy the crops.

Significantly, Tamuno also that the economic burden of flooding includes the destruction of properties as well as means of livelihood.

Paul shared his own personal experience of the floods, highlighting the economic and psychological impact the flooding had on him and those around him:

> I had a personal experience … I had a poultry farm and a fish farm, so when we had that flooding that happened in 2006 and 2007, the flood entered my farm. I lost so many birds then even the fish ponds were filled up, you know, overflown with water, the fishes came out in the compound, in the premises, in the drainage we were seeing the fishes. I lost so many fishes. I had to sell the birds just so that I don't have a total loss, so I had to just sell at giveaway prices. People were just coming to carry. I could not even sell all so I had to take some to the cold room so yea, I had a lot of loss. I had so much loss, so the effects or impact of this flooding is really negative. Of course for some, like where I had a site around one police post like you are going to Igwurita-Aluu road, I know of one man that is close to the site where we were developing, last year, they moved out of their house because the whole place was covered with flood, you know, after a while, this time when the flood went down, they returned back and as it happened this year again, he packed again. Somebody is sheltering them so it's negative. A lot of properties in the house, people lose their property, people lose electronics, in most cases, children get drowned especially when their parents are not home, so it is negative. Impact of the flooding is really negative.

Paul elaborated on displacement caused by flooding:

> It [flooding] has a lot of impact which you and I know. One, it will make you a Refugee, it will displace you. If you are a farmer it is going to destroy your farm and when something touches your economic backbone, are you a living being at all? It causes death and sickness most of the flood that came in 2012, the level of the water stays for about six months.

Displacements are common during the floods. Like Paul, the author has had personal experience, as my own family has experienced displacement due to flooding in 2016, 2017, 2018, and again in 2019 for periods of up to six months.

Reports of wild animals and dangerous reptiles invading people's homes during flooding is quite common (Akasike, 2017). Priye commented:

> Snakes, wild animals were going into people's house biting people and some other things. It [flooding] influences the utility [infrastructure] even within the town, too much percolation will kill the road, the road will go. If power is constant some people will be electrocuted, more buildings will collapse, there will be pressure in the health system. The money they will use to develop some other areas will go for health. Government will be disrupted so it has many impacts.

Priye also describes the impact of floods on physical infrastructure and organizational infrastructure such as the smooth functioning of the government or the delivery of essential health services. Running the government is impacted as workers cannot go to work if their offices are overtaken by floods, as was the case when the Federal Roads Safety Commission Office was flooded in 2017 (See Figure 3 below). Healthcare infrastructure is also affected by flooding. Hospitals cannot deliver important services when they are flooded leading to higher mortalities from secondary causes during flooding events (Menne, Brown, & Muray, 2014). In many cases, the flood waters are so high that economic activities are shut down because people cannot leave their homes without risk of drowning (Ikechukwu, 2015).

Figure 3: Flooded Federal Road Safety Commission Premises (Source: Vanguard Newspaper July 24, 2017)

Nigeria is a religious and predominantly Christian country. In Port Harcourt churches form a central aspect of the residents' lives. Elaborating further on the social impact of flooding, Priye related the pain of churchgoers who were displaced from their place of worship by the floods:

> Even the social system and the traditional system will be destroyed. Those that believe in shrine worshiping and some other things, if your shrine is flooded, you are disconnected. Also in a religious body, if your church, which is the larger assembly point, is occupied, such as Winners[4] [a church], if you are coming now you will see the place they have they being worshiping there for almost one year now. They have not being worshipping there [Winners'] — you know the pain of relocating from an area where you are used to communing with God. You are now spending more money [transportation costs to alternative places of worship], so these are the problems.

The poor of any society are worst-hit during environmental disasters because they are already socio-economically disadvantaged (Yamin, 2014). In Port Harcourt, increasing demand for housing due to urbanization has increased land and housing prices beyond the reach of the poor who are forced to the less desirable and more disadvantaged areas (Kio-Lawson, 2014). They must have a place to live as shelter is a basic need. Some of these people then relocate to cheaper areas, such as waterside[5] settlements, and build whatever form of structure they can afford. There is minimal infrastructure in these settlements, such as basic sanitary facilities, and faecal matter is carried out in the open sea waters (Obafemi & Odubo, 2013). Disease outbreaks are common during the rainy seasons as a result of rising tide and floodwaters contaminated with human waste and refuse. The waterside settlements of Port Harcourt have a resident population of over 500,000 (Kio-Lawson, 2014). Given the dense population in these settlements, a public health disaster always follows flooding episodes.

[4] Winners church is one of the bigger Pentecostal churches in Nigeria. Priye is talking about one of the branches he passes by on his way to work daily that was overtaken by floods in 2018.

[5] Waterside settlements refer to informal settlements on reclaimed land along the several creeks and waters surrounding Port Harcourt city. These settlements developed over the years without any formal participation, approval or interest by government. The settlements are known for lacking basic amenities and infrastructure. A lack of adequate sanitation poses severe environmental and health concerns which is exacerbated by flooding.

Figure 4. A Port Harcourt community ravaged by floods (Source: Vanguard 21 June 2018)

Proper planning would have ensured that there is no settlement in these areas, or that the development of these areas was to standards that afford basic sanitation levels, for instance, availability of sewerage systems. Tamuno also highlights the rise of informal settlements due to increase in land prices from urbanization and the attendant impact;

> Urbanization is so high and that is why you see a lot of informal settlements. The land value is high to the extent that the poor are denied access to the land and when that does happen they move to the fringe and that is why you see most of them will stay in a wet area because it is not expensive.

Ovunda describes the impact of flooding on the health of those affected:

> The impact it has, flooding is a negative one because when the place is flooded people will be exposed to different dangers. The flood will go up to the thick bushes and forests. Wild animals, reptiles, snakes will all come to the places of the highland and the highland area is where people live so they will be looking for where to perch on. Two, because of the system that is being in use here, flooding will also expose people to epidemics like cholera and some other things will come as result of this because the soak away, the sewage system will be polluted, such that even at some point, the underground water will even be polluted. So people will be subjected to different manners of sicknesses and all that.

Significantly, Ovunda notes that some of these worst hit areas are already in disadvantaged areas (Tari, Brown, & Chikagbum, 2015). The flooding disaster only worsens their living conditions. Barry's comment highlights the health impacts of flooding:

> It is a big problem. In short, it is really bad. It dislodges the residents making them not to have homes again. Sickness all over, some of them as a result of that, they couldn't survive. They died as a result of flooding. So it has a very big impact. The government have to look at and find a solution by making sure the development plan is adhered to.

Infectious diseases outbreak is also widespread because of the pollution problems that go hand in hand with flooding. According to WHO (2012), immediate health risks posed by the 2012 flooding in Nigeria included outbreak of foodborne and waterborne diseases; displacements resulting in overcrowding in temporary shelters which promotes the spread of transmissible diseases like measles; medium term risks of malaria and yellow fever as a result of proliferation of vector breeding grounds; limited access to health services as a result of the destruction or overwhelming of the health infrastructure, damage of drugs and supplies and displacement of health-care workers themselves; and transmission of communicable diseases and malnutrition which weakens immunity, and leads to more frequent bouts of infections. These health risks remain present during every flooding disaster.

The health impacts of flooding on residents of mostly indigent neighbourhoods has been widely explored in research. Olanrewaju et.al. (2019) found that as many as 47.1% of residents of an indigent Nigerian community suffered Cholera and dysentery due to breakdown of sewerage systems and subsequent contamination of water and food during flooding. Malaria, skin diseases and other water-borne diseases were rife during and after flooding episodes. In 2018 in Rivers State, there was an outbreak of skin diseases in some communities who had no choice but to bath, drink and cook with the contaminated flood waters (Iheamnachor, 2018a). Numerous other instances exist where the floods have led to deaths (Dickson, 2018; Ikechukwu, 2015; Oriji, 2015).

Rainy seasons in Nigeria are characterized by annual flooding and its associated impact. While in some places, people pray for rains for its associated benefits to the ecosystem and suffer if there are no rains, the reverse is the case in cities like Port Harcourt that experiences serious flooding on a regular basis. Just as was the case during Australia's severe drought[6] in 2018, the imminent flooding associated with the rains in my city (Port Harcourt) had me saying two opposing prayers at the same time, one for rains in Australia and another for scant rain in Port Harcourt to avert flooding.

5.3 Flooding and waste management in Port Harcourt

The poor attitude of Nigerians to waste disposal attitude has been widely discussed in various studies (Eneji et.al., 2016; Ojo & Adejugbagbe, 2017; Olukanni et al., 2014; Sridhar & Ojediran, 1983). Drainage blockages linked to poor sanitation practices is common in Nigeria's highly populated urban areas like Port Harcourt. Roadside dumping, canal dumping and dumping in rains is commonly practiced among a large proportion of the population. This causes blockage and results in flooding during the rainy season.

In Paul and Ovunda's view, the poor attitudes of the residents, which they saw as bordering on ignorance and lack of awareness about waste management, contributes to the flooding. Significantly Paul comments that a poor waste management attitude means the people see the rains as a time to dispose of rubbish in the drains. He states:

> Of course, you also have the refuse disposal mentality of the people, poor mentality of the people towards refuse disposal, you know. In Port Harcourt, if it starts raining, people bring their refuse and start throwing into the canal or the waterway, you know, all of them gets stuck somewhere like a bottleneck, and then returns the water back to the place.

Paul's comment describes lack of knowledge by the people on what happens to the rubbish carried off by the water, which gets piled up at a place and obstructs the flow of water and

[6] Australian states like NSW and Victoria recorded one of the more significant droughts in recent history in 2018. Autumn, the season associated with the most rain begins in March in Australia and coincides with the beginning of the rainy season in the southern part of Nigeria which lasts till October.

contributes to the flooding. Ovunda also shared Paul's view that a lack of understanding of effective solid waste management also contributes to the problem of flooding. He said:

> Some of the factors are human activities, human factors lack of environmental (awareness), and lack of proper management of solid waste.

Indeed roadside rubbish, and drains covered in rubbish, are not an uncommon sight in Port Harcourt city.

Figure 5: A section of a drain filled with rubbish in February 2019 (Source: author).

Figure 6. Piles of rubbish at the Nkpolu axis of East/West road, Port Harcourt. Photograph from The Guardian (Nigeria), August 11 2019.

5.4 Addressing the flooding: Urban planners' perspectives

Despite the planners' concerns and disappointment with the lack of compliance with planning laws and widespread practice of dumping by the population that contribute to the attendant flooding being experienced in Port Harcourt, they had a positive outlook for the future and proffered a range of suggestions on how the current situation could be improved to achieve sustainable development. These included collaboration among all stakeholders, cooperative implementation of existing planning laws and policies and improved infrastructure as detailed below.

5.4.1 Collaboration among all the stakeholders and cooperative implementation of the existing planning laws and policies

Collaboration was strongly called for, and the planners saw themselves as having an important role to play. Tamuno remarked:

> It is to work with the communities and government, especially in the new directions,[7] the new growth directions, to put in place proper land settlement [community land settlement] so that, we will not increase the problem … For example if there are drainages and the drainages are well connected and all those things, at least after some minutes (if it rains), it can get ... the flood away….. So we need to really do a proper drainage master plan. We need to do an infrastructure master plan. Seriously, with the government backing and the community people so that we look at this thing, and perhaps even do some simulations, because what they see, they appreciate more. "Look if you do this and there is flooding and all those things, well …", so we do the simulations so that the community and land owners will see that this thing is real. "If we don't take this measure this is what will happen". So the new areas by the time we start the work and simulate, they will know what has happened to other people and then, they can say "ok, let us key into this vision".

Significantly Tamuno sees that government planners have an important role in community education about flooding. Paul also emphasized education of the residents and its important role and relevance to urban planning policy and law. Paul opined that the government planners have to engage in more field work and carry out layouts of developing areas. He stated:

> By coming out, going into the developing areas, let the people know where we have natural waterways so that you know that you don't go beyond, you don't build over where you have right of way, these waterways, you know, let them map out, let people know where you are supposed to develop, where you are supposed to build and where you are not supposed to build, and then, they also need to do some form of campaign or enlightenment campaign or sensitizing the people, poor

[7] By new directions Tamuno means the new developing areas of Port Harcourt city

> attitude towards refuse disposal, you know like I said, when it starts raining, people bring their refuse and dump inside the canal or the waterways you know.

Paul also shared a story of how a high-ranking government personality built a house over a key canal and caused flooding which impacted the residents for many years until the government of the day demolished this illegal structure. He commended the government for their actions at the time and also explained how they expanded the canal which enabled better flow of storm water and solved the flooding problem in that neighborhood. Paul's example shows that decisive action by the government is needed to tackle the flooding menace. Similarly, Priye also believed that planners have a role to play. He stated:

> What the urban planners can do to control the flooding is that one, the urban planners should collaborate with the government so that all the policy documents that concerns planning should be implemented because government cannot put law and ignore and deviate from the law they have put in place, and planners should engage more on advocacy.

5.4.2 Improved Infrastructure

Barry emphasised the need for drainages as an integral part of every building construction which must be linked to appropriate channels and called for underground drainage as a better solution to the surface drainages which are more common in Nigeria. He believes that underground drainages are the best solution for the local situation where residents are prone to dispose of rubbish in open drains.

Advocacy in urban planning involves giving under-represented people a voice in planning (Stramrud, Galland, & Ås, 2017). For Ovunda:

> The most important things that can be done by urban planners to control the flooding is first of all to remove, clear the existing canals and drains, and establish new canals that will carry water, runoff water from the surface down to ocean.

Ovunda's suggestion would help alleviate the flooding problem as it has been shown that there is poor infrastructure in the city and a need for sustainable and properly channeled

drains. Indeed the government has failed to provide basic infrastructure like storm water channels for the people (Adeloye & Rustum, 2011) which has made the rainy seasons akin to nightmare for city residents. Paul also accentuated that clearing drains and improving infrastructure solved the flooding problem which also plagued his suburb for many years.

5.5 Conclusion

This chapter has demonstrated how poor planning and/or lack of compliance with planning are the main factors in the flooding problem in Port Harcourt city. All of the impacts of flooding such as building collapses, as identified in this study are negative, hence the desire on the part of the people to raise awareness on the flooding problem. Given the respondents recognised the importance of planning to promote sustainability, there was a consensus that better planning can solve the problem of flooding if all the concerned parties could work together. Collaboration among all stakeholders is also identified as an important tool in solving multifaceted problems like the flooding in Port Harcourt. The final chapter, Chapter Six, presents key findings of this research and makes recommendations for change.

Chapter 6: Conclusion and Recommendations

6.1 Introduction

This study set out to investigate the relationship between urban planning, sustainability and flooding in Nigeria and used Port Harcourt city as a case study. Flooding is the most widespread environmental disaster in Nigeria and it has been linked to poor urban planning. Flooding threatens Nigeria's ability to achieve sustainable development as it impacts all three bottom lines of sustainability; the social, the environmental and economic aspects. More specifically, it is a direct impediment to Nigeria achieving the UN's SDGs 1: No poverty; 2: Zero hunger; 3: Good Health and Wellbeing; 4: Quality education; 6: Clean water and Sanitation; 8: Decent work and economic growth; 11: Sustainable cities and communities; and 15: Life on land. While a continuation of flooding in Nigeria will hamper progress towards the achievement of the SDGs, examining how the flooding has come about aims to contribute to mitigating the problem through various means including devising better public policy approaches, public education and addressing corruption. In concluding, this chapter summarises the research process, identifies key findings of the research and makes recommendations for future directions. The chapter is presented in two sections, section one highlights the findings while section two proffer recommendations.

Section one: Findings

6.2 Sustainability as the main goal of planning

This qualitative research set out to find out how the concept of sustainable development is understood among planners in Port Harcourt, how urban planning influences the flooding being experienced in Port Harcourt and sustainable development, how the flooding impacts residents of Port Harcourt, and the ways the flooding could be controlled. To answer these questions a review of the literature on sustainable development and urban planning was undertaken and urban planners practicing in Port Harcourt were interviewed to gain insight

into the relationship between urban planning, sustainability and flooding. The semi-structured interviews provided the primary data informing this study.

The research identified urban planning as the key to achieving sustainable development. To the planners, sustainable development is not a new concept but resonates with traditional land management practices in Nigeria. The planners stated that development is about the long-term future and should be geared towards improving the lives of the people. This understanding is in line with current global urban planning practices where sustainability has emerged as the heart of planning (Al-Hadad, 2013; Säynäjoki et al., 2014). The urban planners in this study all understood planning to be integral to achieving sustainable development. To them, achieving sustainability is the central purpose of effective planning and the key objective of the design of the master plan. They saw the relationship as being so intricately interwoven that it was difficult to separate the two terms.

6.3 Flooding, urban planning and sustainability inextricably linked.

The research established a clear connection between Port Harcourt's flooding, urban planning and sustainability. Poor planning practices, and poor compliance with existing planning laws and policies, has led to flooding in most parts of the city and a worsening of the problem experienced year after year (Elenwo & Ugwu, 2018). Significantly, this study affirmed that most of Port Harcourt's development is unplanned and unregulated, which is the main factor in the city's flooding problem. This is antithetical to achieving sustainable development. According to the urban planners in this study, for sustainability to be achieved, the built environment needs to come to the forefront of urban planning because the built environment has most impact on environmental sustainability. Social and economic sustainability in Port Harcourt is dependent on people inhabiting a flood-free environment, which will enable them to thrive and be in good health. Only then will other goals of sustainable development be realized.

In Port Harcourt, as across Nigeria, urbanization has led to an increase in demand for shelter. This has led to various forms of housing developments being built, and the rise of informal settlements in Port Harcourt. The population of Port Harcourt has grown significantly since its creation in 1912 (as discussed in Chapters Two and Three). The growing population has put pressure on the city which was not originally designed to cater to the present population boom. Specifically, the original infrastructure can neither meet the needs of its current population

While urbanization is itself a development process and should not be discouraged as there are benefits to people living in the urban areas (Habitat, 2016), the difficulty, as has been identified in this study, is in the management of the process. In order to avoid a drastic deterioration in the quality of life of people, planning should come into place to align the development process positively.

The poor are denied access to land as a result of affordability and forced to live in cheaper areas more prone to flooding. This has meant that building developments continue to spring up, even on waterways and floodplains, and this has significantly contributed to the annual flooding problem. Planning, or the lack of planning, is thus linked to the flooding problem.

6.4 Strong feature of sustainability in current planning laws

This research found that the planning laws in Rivers state prominently featured sustainability principles. The planners were unanimous in their opinion that the current laws featured sustainability adequately (see chapter Four). The point of divergence centred around whether there is a need to change the laws to better feature sustainability. On this issue, some of the planners believed that nothing needs to be changed, but efforts should be centred around implementation of the laws, especially in the areas of development control. Others thought some aspects of the law should be changed to allow for more powers and autonomy, mainly in the area of generation of funds to enable the GPHCDA to be more self-sufficient. The law

succinctly provides for periodic review of the master plan, but this is currently not being implemented in Port Harcourt and other parts of Nigeria, a fact the planners decried. However, it is not surprising that there has been no review of the master plan since it is not being implemented in the first place.

6.4.1 Weak implementation of the planning laws

Even though the current planning laws were deemed standard, this study found that there is very poor implementation of the laws as well as development control in Rivers state. There is also a lot of political interference in planning work, understaffing and lack of provision of working equipment which negatively impacts effective planning and execution of duties by the planners. The lax planning laws has seen construction projects on natural floodplains and stormwater paths granted valid building approvals, which has exacerbated the flooding problem and impacted on sustainability. The people also capitalize on the loophole of ineffective development control and a lot of times extend their buildings over the approved areas and in some cases go as far as building over drainages. The non-implementation of the laws is inimical to achieving sustainable urban development. The failure of the Ministry of Urban Development to take control of planning in Rivers state led to the birth of the GPHCDA to address the shortcomings of the ministry**.**

6.5 Lack of community participation in planning

The research identified a lack of community participation in planning, highlighting a gap between practice and the planning law as stipulated. Inadequate community participation in planning has also been identified in previous studies (Brown & Wocha, 2017; Chado et al., 2016). In this study inadequate planning had led to setbacks and logger-heads between the communities and the government in Rivers state whereby the community opposed government development proposals and policies, seeing them as land grabs and government oppression.

Community opposition to government planning policies was also identified in this study. Such opposition was caused by a lack of initial involvement of the community in the drafting of development and planning proposals and policies. The result is that even when the government's policies would be of benefit the community, people still opposed it. This antagonism appears to be due to a lack of cooperation between the parties at the initial planning stages, which has led to a lack of community understanding of both the proposals and planning policies, as well as the benefits accruable to the community. The lack of community understanding, along with a poor perception of government's intentions, results in a lack of support, or sometimes outright opposition, to new planning proposals.

6.6 Poor waste management practices

Poor waste management is one of the anthropogenic factors contributing to flooding in Port Harcourt. Poor waste management practices in Nigeria generally and Port Harcourt in particular (Ojo & Adejugbagbe, 2017) have exacerbated an already difficult flooding problem. Port Harcourt was once known as the 'garden city' as a result of its clean and beautiful environment, but today, the moniker 'garbage city' has been deemed more appropriate as a result of its current unsightly state (Bodo, 2019).

Open dumping is commonly practised and a good number of people choose to dispose of their rubbish in the drains when it begins to rain. According to the urban planners in this study the rubbish clogs the drains and leads to flooding. There is seemingly little understanding of the implication of their actions, nor are there attempts to provide education on waste disposal, or waste disposal services.

6.7 Wide reaching impact of flooding

The impacts of the flooding in Port Harcourt are enormous affecting the social, economic and environmental sustainability of the city (Ikechukwu, 2015). The incidence is so widespread that a significant portion of the population is impacted in some way. Three of the five

respondents in this study were directly affected by the flooding and all had experienced some sort of indirect impact. Identified negative effects ranged from internal displacements, health impacts, and economic loss to psychological trauma and even death. Socially, flooding destroys the fabric of the community by causing displacements from homes and other important places of social congregation such as churches and schools. Flooding associated deaths are also common. Economically, businesses and property are destroyed and the monetary value of losses is colossal. Environmentally, flooding leads to pollution and degradation of land and loss of local flora and fauna. Health wise, there are numerous flooding associated diseases. The already poor infrastructural base of the city is also impacted for example, roads, power, and building collapse. Flooding places greater pressure on the health system and funding that should be geared towards other areas of development is diverted to meet health needs. Government services are disrupted, as well the social systems and religious worship.

Section two - Recommendations

From the findings of this research, the following three recommendations are deemed relevant to combat the flooding issue: (1) Provision of infrastructure, proper waste management practices and sensitization of residents; (2) Implementation of laws and development control; and (3) Community involvement in planning and collaboration among all stakeholders. These are discussed in detail below.

6.8 Provision of infrastructure, proper waste management practices and sensitization of residents.

The current situation where there is a dearth of effective drainage infrastructure in Port Harcourt must be addressed if the government is serious about controlling the flooding menace. An effective and sustainable drainage network is very important for every city and a sustainable drainage and infrastructure master plan is necessary for a long-lasting solution. Rather than surface drainage, underground drainage is strongly recommended as currently

surface drains are clogged by rubbish dumped by residents. More immediately, existing drains must also be cleaned and properly channelled. Clearing the existing canals, as well as constructing new ones, will help control the flooding and runoff from stormwater.

Public education services and public waste services are also required. There is a need for a public education campaign to educated city residents on proper waste disposal techniques to stop the practice of indiscriminate dumping of refuse in waterways, especially when it rains. The waste management process must be improved through effective waste collection methods established in every locality to address the current indiscriminate dumping of household rubbish and other forms of waste into waterways, which contributes to the flooding problem.

6.9 Implementation of Laws and Development Control

Laws are meant to be implemented. At present the laws exist but are not enforced. This situation does not bode well for Nigeria's future attempts to meet the SDGs. A master plan should guide the development pattern of a city but this is not the case in Port Harcourt where the master plan has been largely neglected in the city's development. The relevant authorities must make an effort to carry out development control, adequately map out new areas in line with the provisions of the master plan, as well as remove non-compliant or illegal structures which block drainage pathways. Construction on floodplains must be discouraged and residents in flood-prone areas should be relocated to areas less at risk, with adequate housing arrangements made for them to ameliorate suffering caused by relocation.

Building without appropriately linked drainage networks should be stopped. Dual use of low-lying areas is encouraged which could serve as water draining points, as well as recreational land. The urban planners in the area of development control should be encouraged to carry out their jobs by providing adequate field vehicles for monitoring constructions. Corrupt public officials who seek bribes and approve non-compliant constructions in unapproved

areas must be sanctioned and weeded out of the system to serve as a deterrent to others. Adequate checks and balances are required to prevent the practice whereby the people in power, for instance the governors, go against the master plan and allocate lands to themselves or their proxies and erect buildings that contravene what has been laid out in the master plans. The laws should be dynamic to reflect current realities. The situation where the master plan merely exists as a document and is neither being implemented nor reviewed in accordance to the planning laws needs to addressed.

6.10 Community involvement in planning and collaboration among all stakeholders

A key barrier to sustainable planning in Port Harcourt was the broader lack of understanding of the concept by the broader public, including developers, which has led to resistance in implementing sustainable planning policies and practices in the city. Urban planning should involve the community, who must make inputs. Non-involvement of residents leads to mistrust and delayals in implementing policies that will benefit the society. If people better understand the vision of the government, there will be less opposition. The current trend in Port Harcourt where policies are made without involving the grassroots is not encouraged and should be changed. Community perceptions of land holding and ownership whereby people sell land without making provisions for roads etc in order to make the most money should be addressed via a collective participation processes.

A shared understanding of the concept of sustainability and the interlinkage between planning and flooding by all the stakeholders is necessary and this could be achieved through public education campaigns. Practical simulations could be employed during community meetings because it would enable people to see what could happen, and which measures should be taken to avert future flooding problems. Such a measure will help drive the message home and allow greater participation in a shared vision of sustainability. Professionals acting ethically and in line with the norms of the profession will help control the flooding problem

and achieve sustainable development. Planners and government are encouraged to work more closely together to ensure the implementation of policy documents. Planners are also encouraged to engage more in advocacy to ensure that every resident has a better living experience. In executing their duties, planners are encouraged to work with the community to consider today's needs, forecast tomorrow's likely needs and decide on the best options to achieve sustainable development.

The government is advised to declare the flooding problem a crisis and treat it as such because of flooding's hydra-headed implications and impacts. Provision of necessary infrastructure should be declared an emergency to combat this serious environmental hazard with wide-ranging negative impact.

6.11 Further research

There is potential for further research on the issue of flooding as many issues remain under explored. The current research could be expanded by investigating the building and construction industry in Port Harcourt, as well as why there is seemingly little to no enforcement of building codes or planning laws. Similar case studies could also be conducted in other cities in Nigeria to generate new knowledge and build up a national picture. Engaging with other stakeholders like the community and government planning bodies also has the potential to generate important information and knowledge. Understandings of sustainability and its links to planning and flooding among non-urban planning professionals and city residents is imperative to gauge the level of understanding and tailor sensitization or education materials to communities. While there is a strong interaction of vulnerabilities and risks in African cities (Frick-Trzebitzky & Bruns, 2017), there is still a need to generate robust evidence-based findings on the type of flooding and its spread so as to assist at-risk African urban centres. Such research would add to the understanding of good global practices

in urban governance and planning at the local level, and may help the world to achieve the SDGs.

6.12 Thesis conclusion

This research has contributed to knowledge of the flooding problem in Port Harcourt and has established that there is a relationship between urban planning, sustainability and flooding in Port Harcourt. It has presented a first-hand account of how urban planners in Nigeria conceptualize sustainable development, an area that has not been previously explored. Knowledge of how practicing planning professionals understand sustainability is important given the key role urban planning plays in achieving sustainable development and the fact that planners are at the coal-face of carrying out planning. The urban planners in this study demonstrated a sound and deep understanding of sustainable development that is in line with contemporary views on the concept. The dominant narrative in the literature that poor urban planning has contributed to the flooding in Nigeria and that good planning will help combat the floods has been affirmed and strengthened by the findings of this research. The urban planners in this study established a connection between poor urban planning and the flooding being experienced in Port Harcourt, as well as poor compliance with planning laws. The impact on residents were found to be myriad and negative ranging from health and, economic impacts, to psychological impacts.

To control the floods, decisive action is needed, especially in the areas of infrastructure provision and full implementation of existing planning laws. Policy makers would do well to enhance engagement with the community in planning matters. This research also found it would be useful to change refuse disposal policies and practices through education and sensitization of the people on issues of sustainability as current practices of refuse disposal exacerbate the current annual floods.

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Appendix: Overview of Research Participants

S/N	Name	Age	Gender	Sector Employed
1	Barry	40s	Male	Government
2	Ovunda	40s	Male	Government
3	Tamuno	50s	Male	Government
4	Paul	30s	Male	Private
5	Priye	50s	Male	Government